

FIG. 1a (Prior Art)

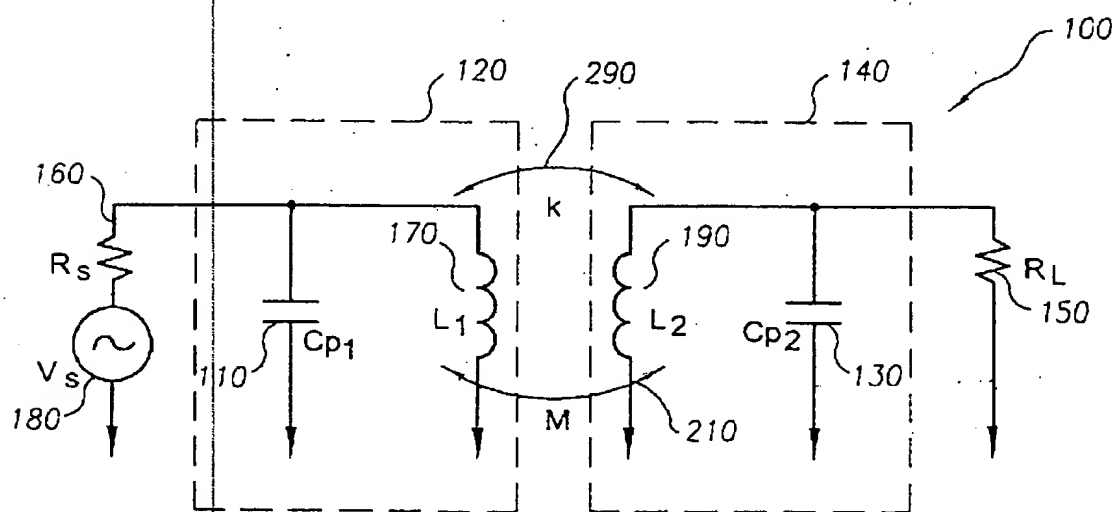


FIG. 1b (Prior Art)

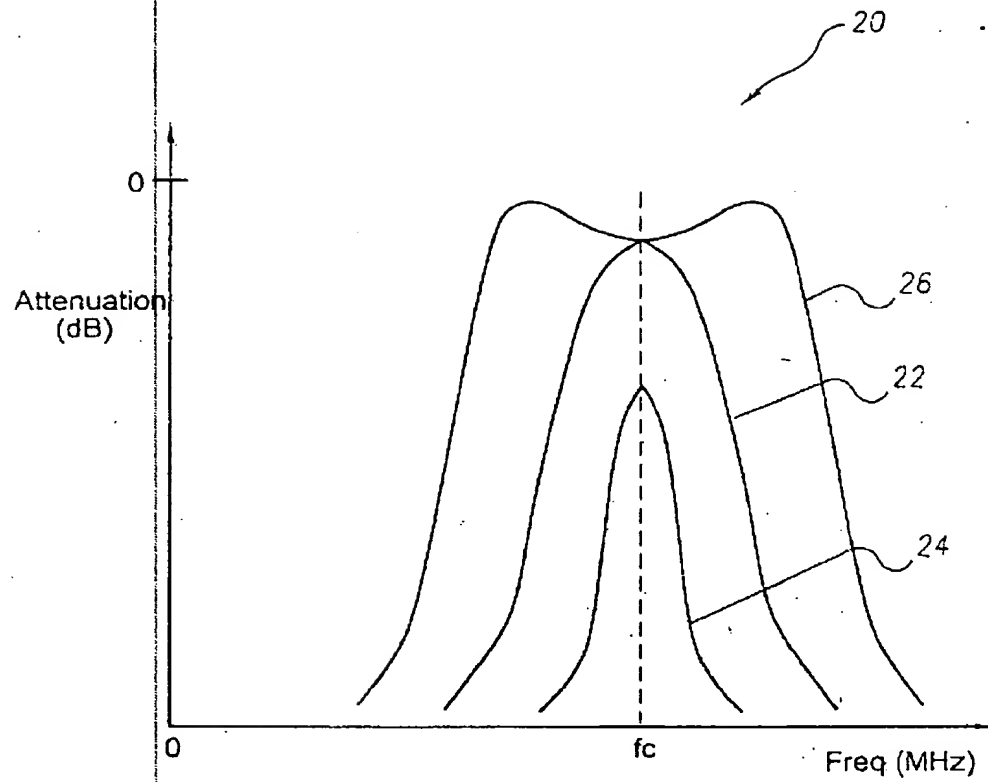


FIG. 2

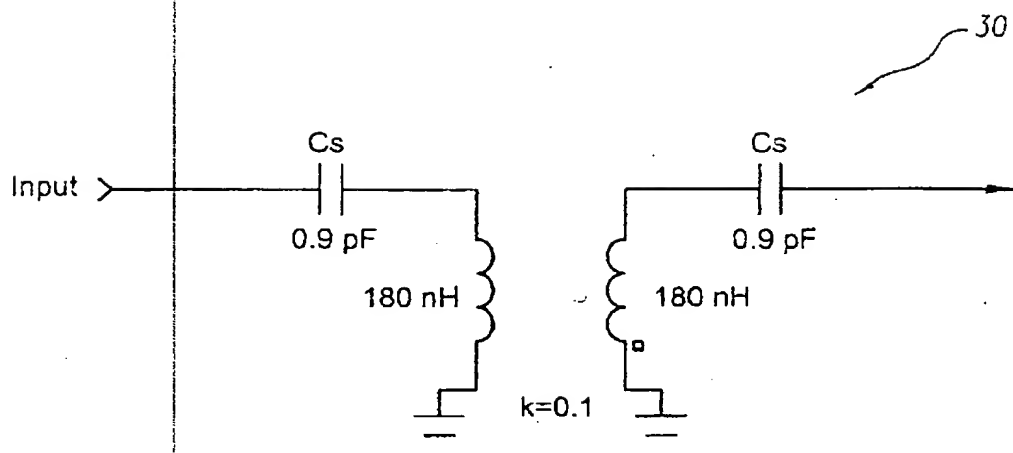
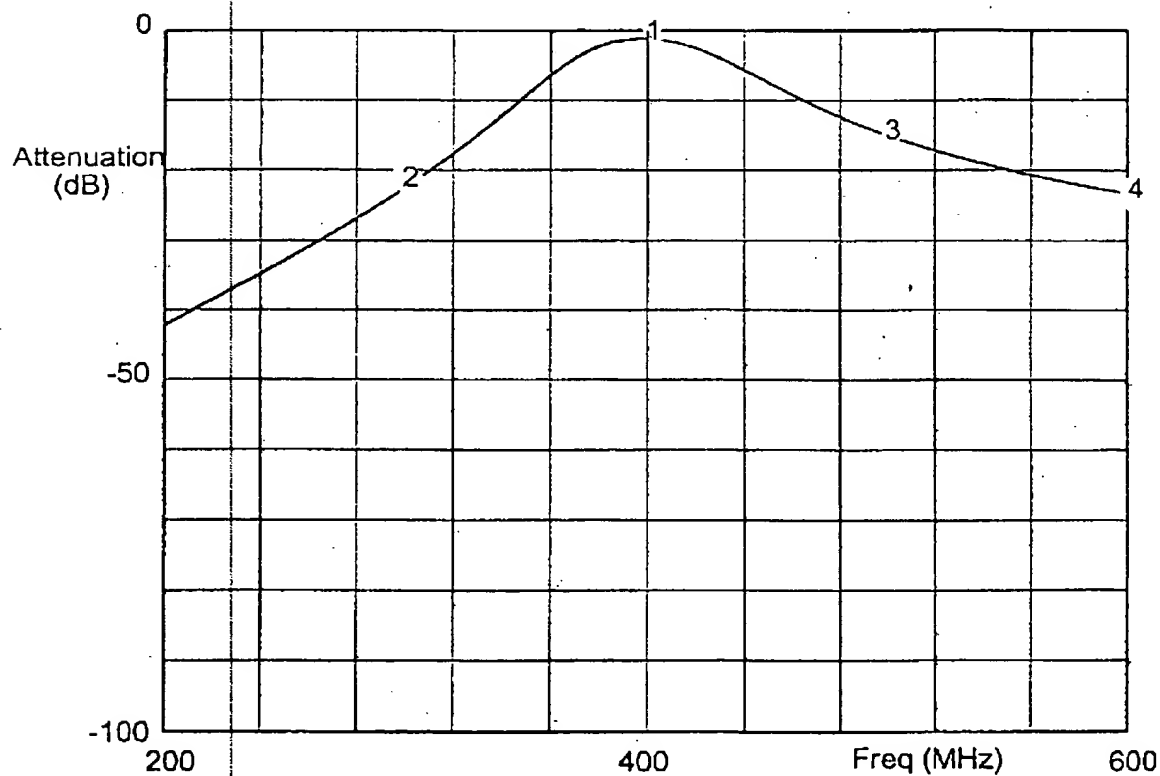


FIG. 3 (Prior Art)



— DB[S21]

1 { 400
-1.197042 { 300
-22.43263 { 500
-15.07344 { 600
-23.2958

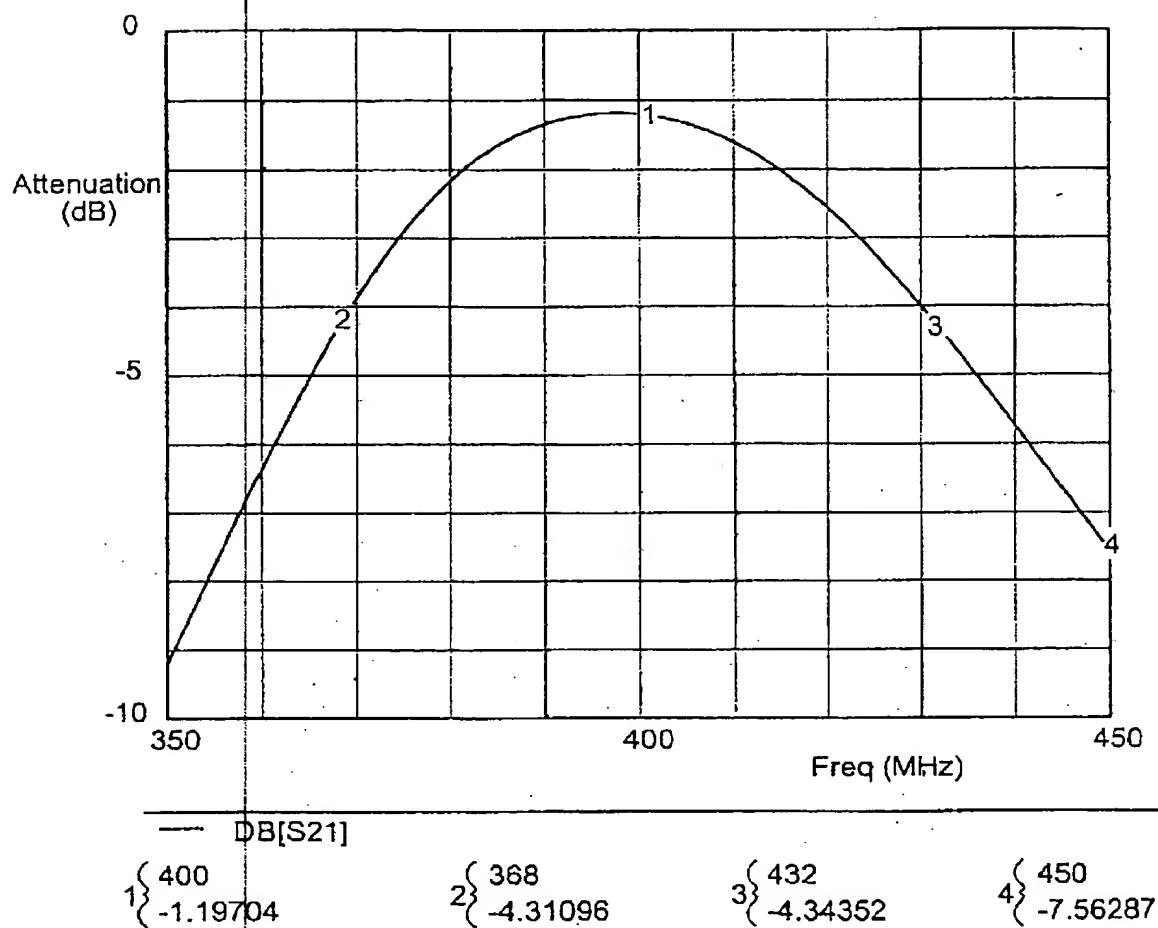


FIG. 4b (Prior Art)

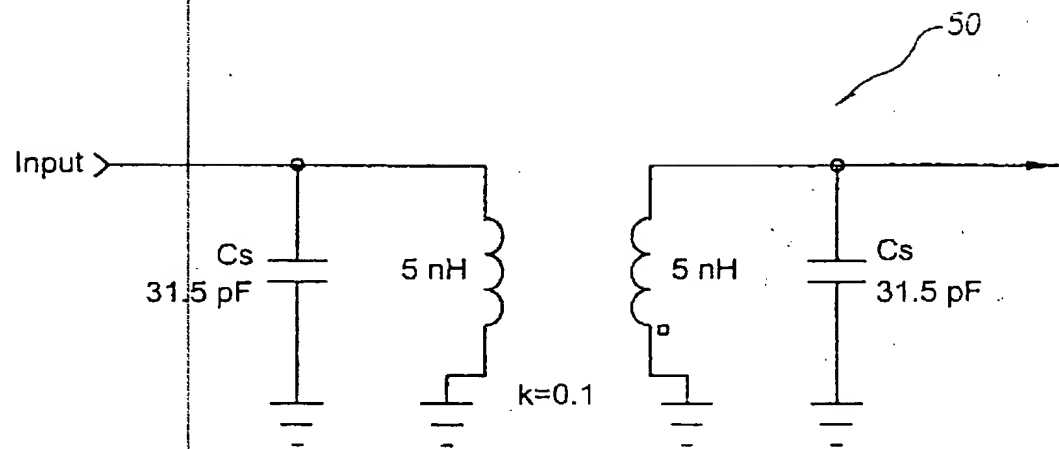
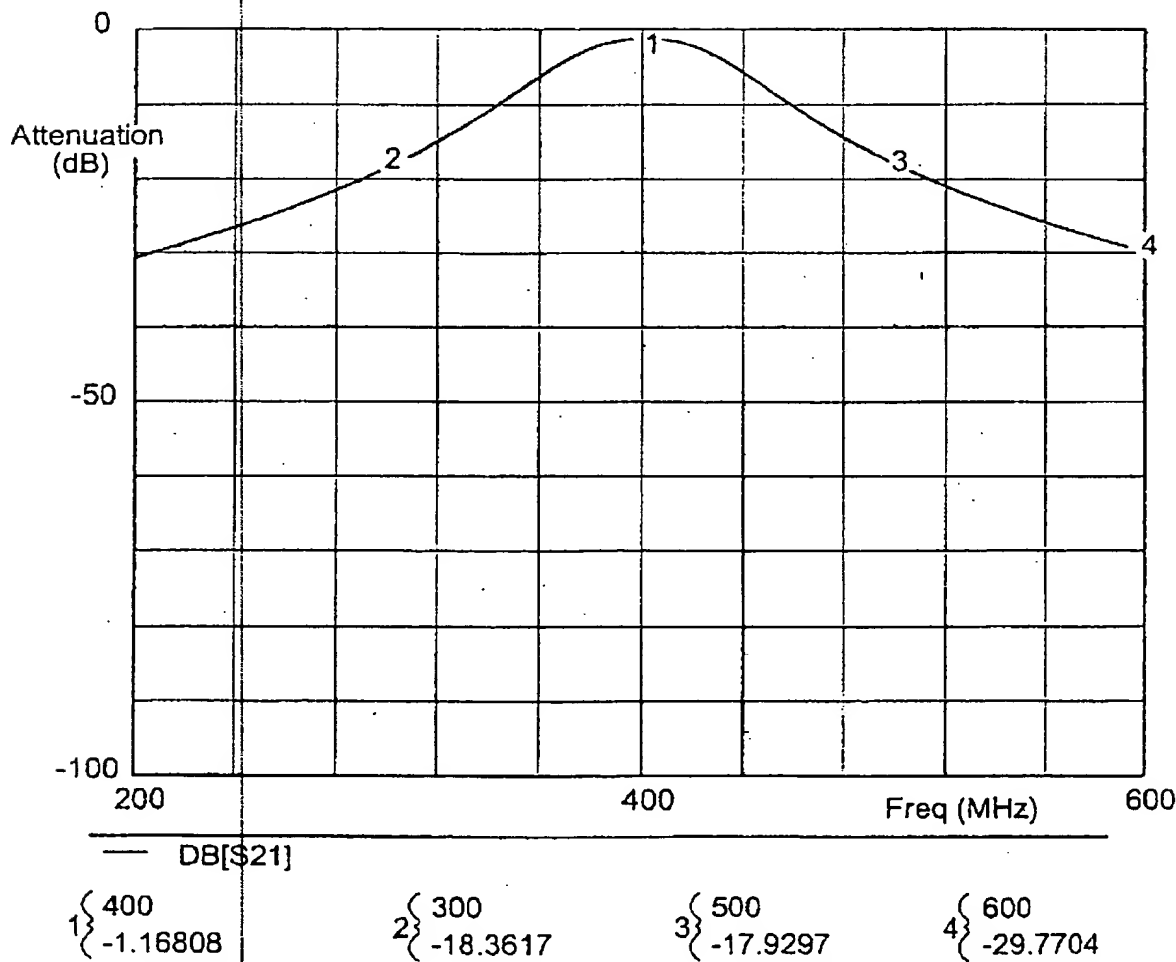


FIG. 5 (Prior Art)



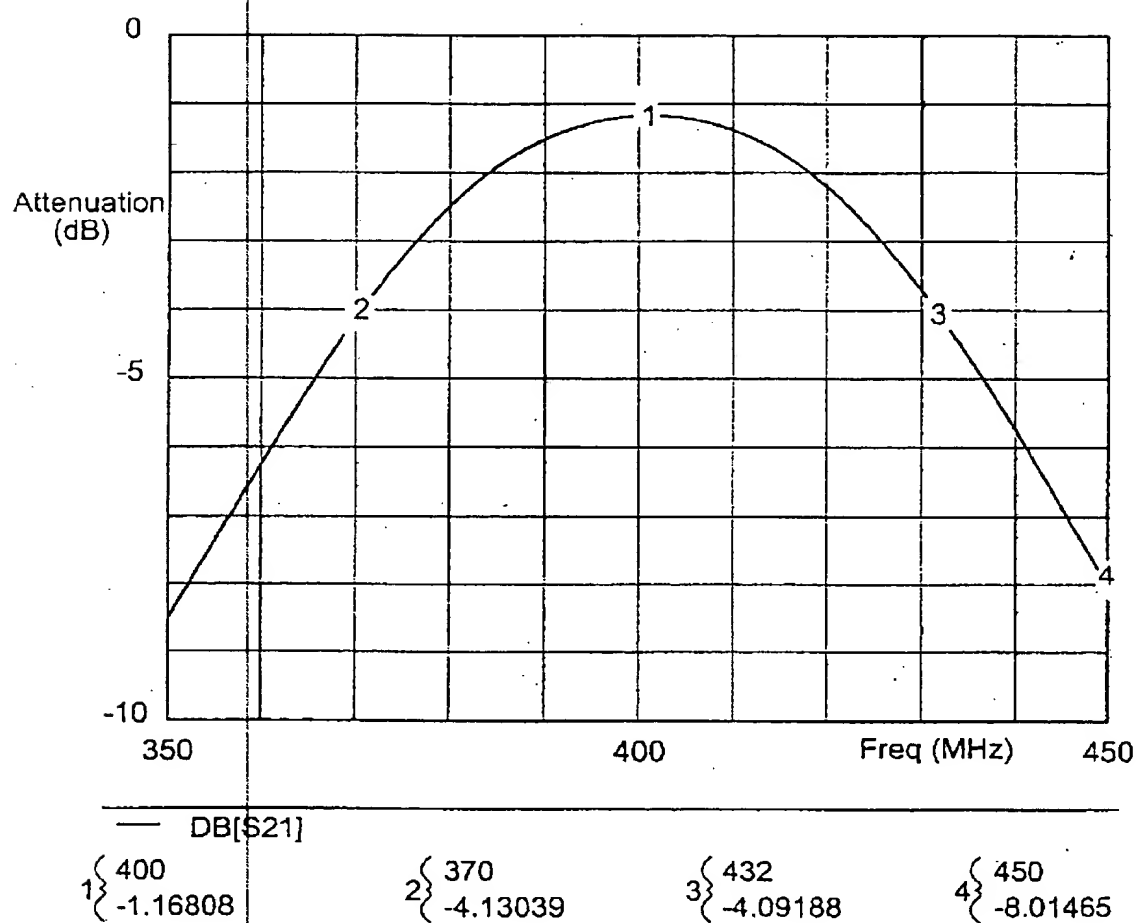


FIG. 6b (Prior Art)

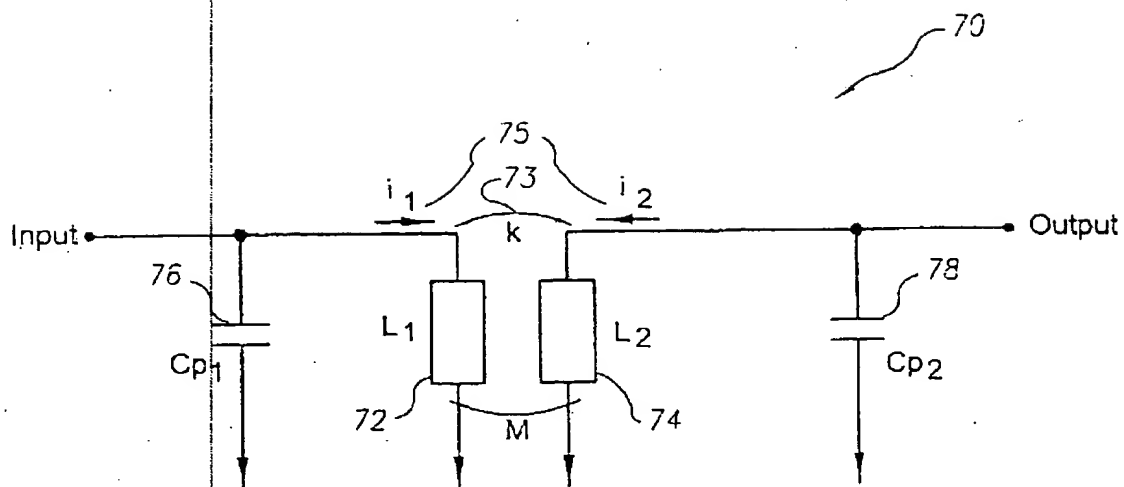


FIG. 7

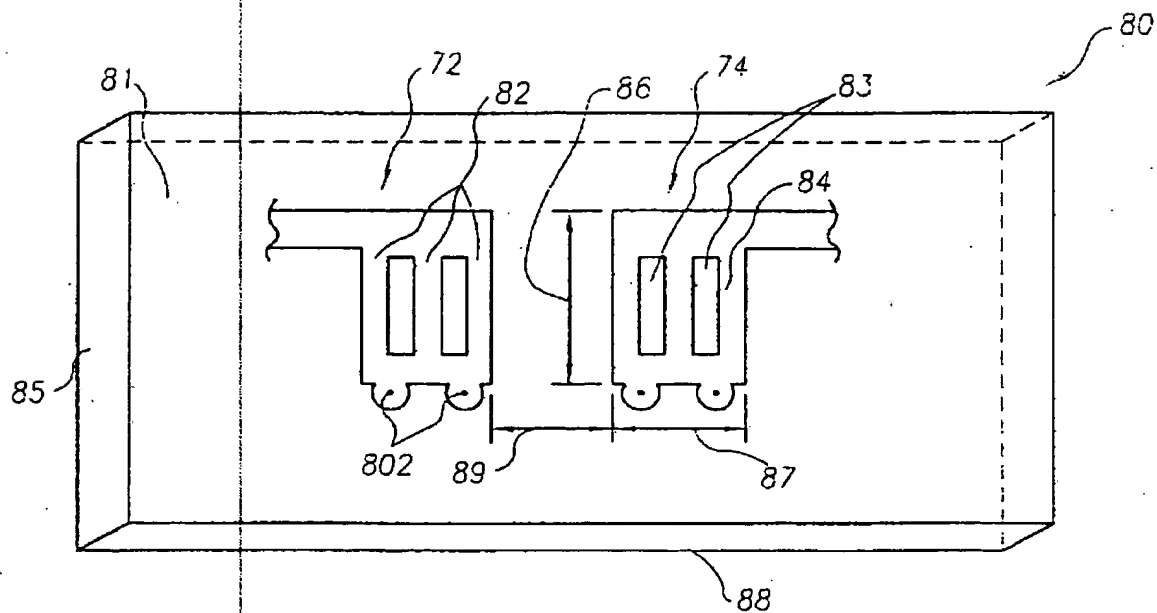
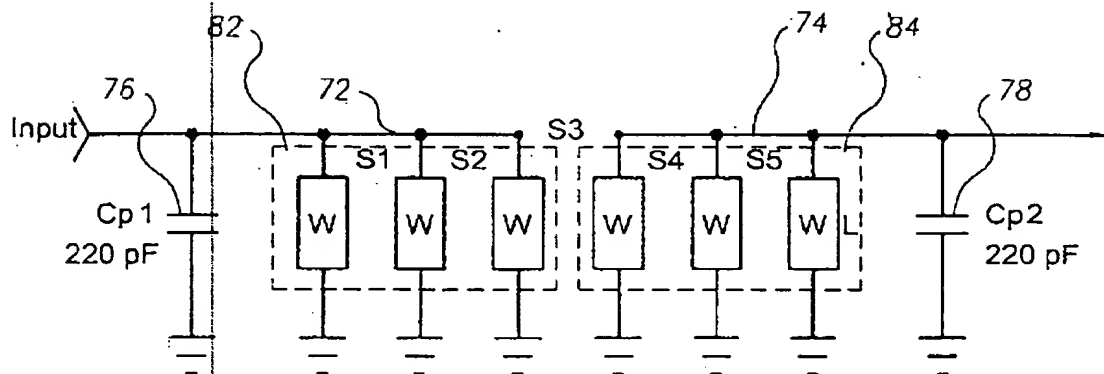
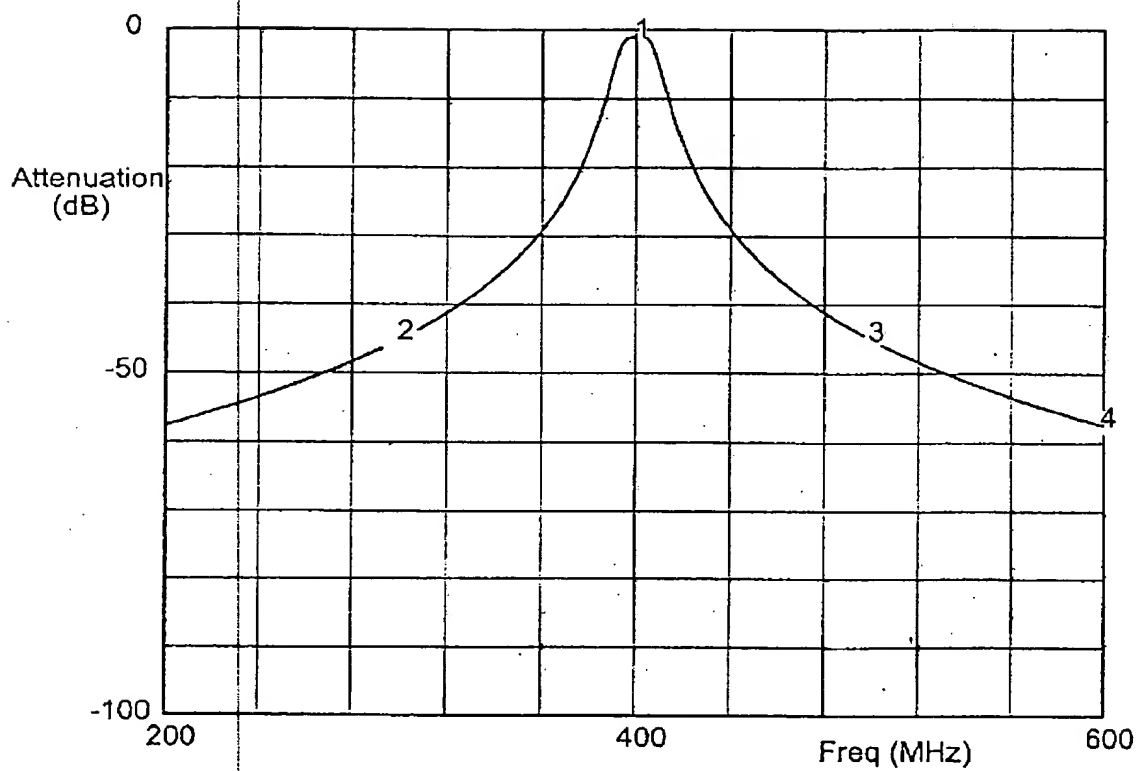


FIG. 8a



Multistrip_coupled microstrip
line(2 resonators, 3 lines each)
Width $W=2$ mm, Length $L=5.5$ mm
Gaps: $S1=S2=S4=S5=3.45$ mm
 $S3 = 3$ mm
Dielectric: $\epsilon_r=4.65$, $\tan\delta=0.001$
Board thickness (hight) $H=1.5$ mm



DB[S21]			
1 { 400	2 { 300	3 { 500	4 { 600
-1.09187	-45.092	-45.1217	-57.4546

FIG. 9a

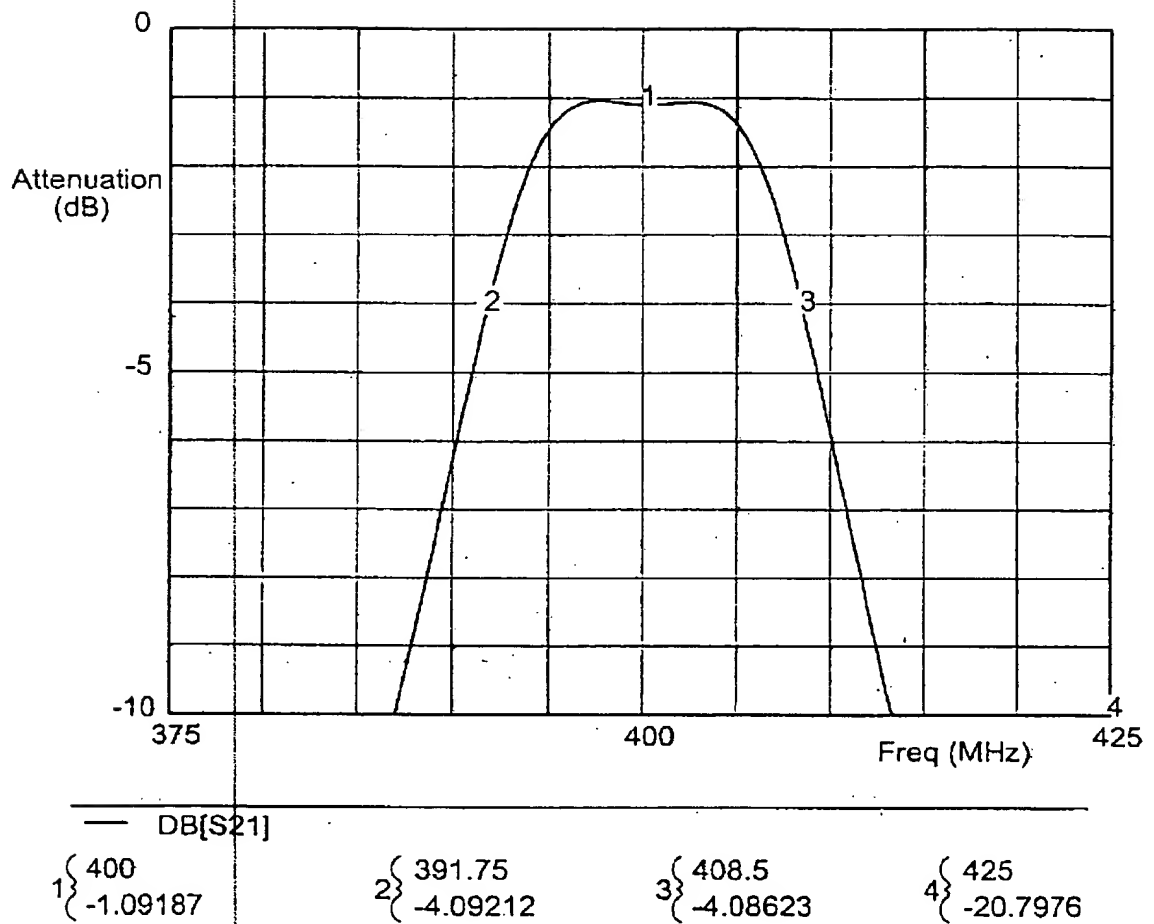


FIG. 9b

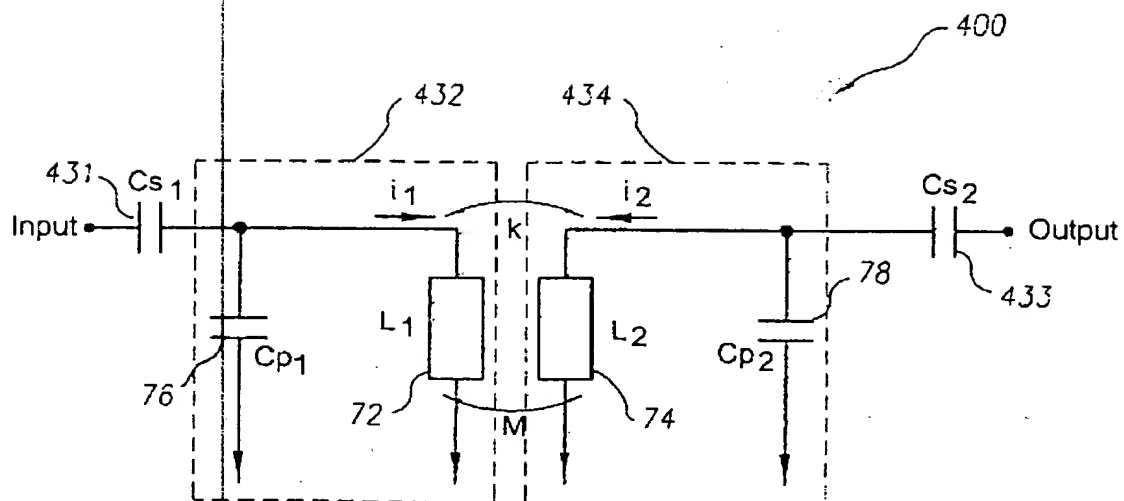


FIG. 10a

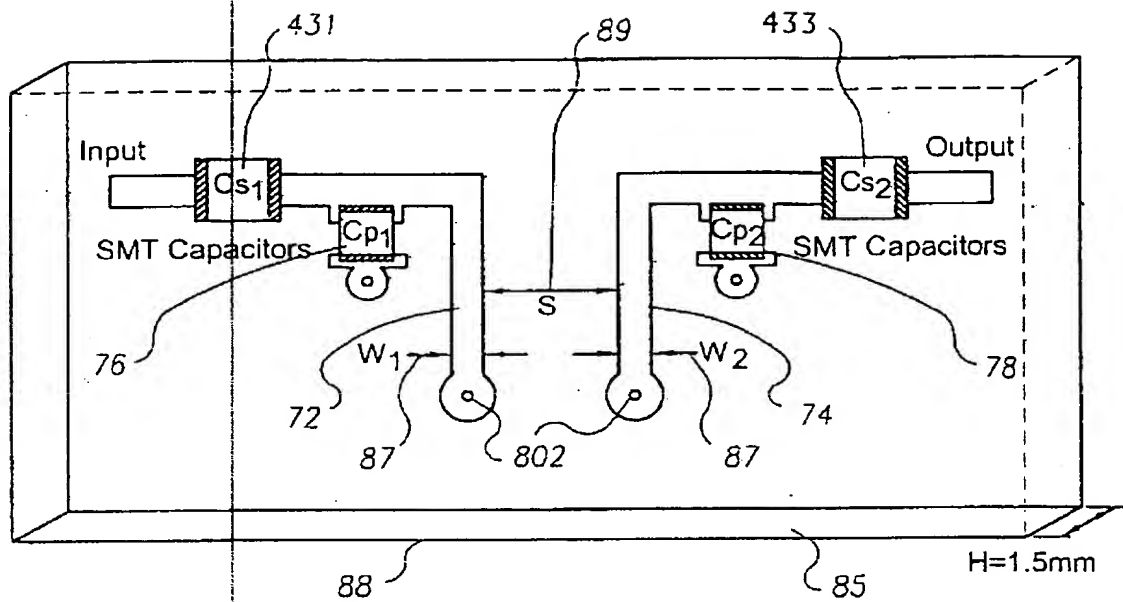


FIG. 10b

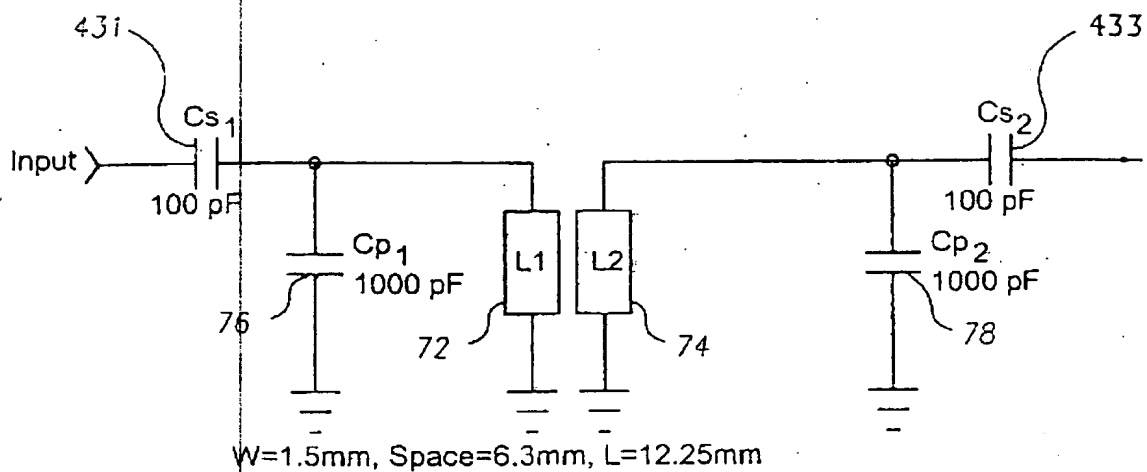
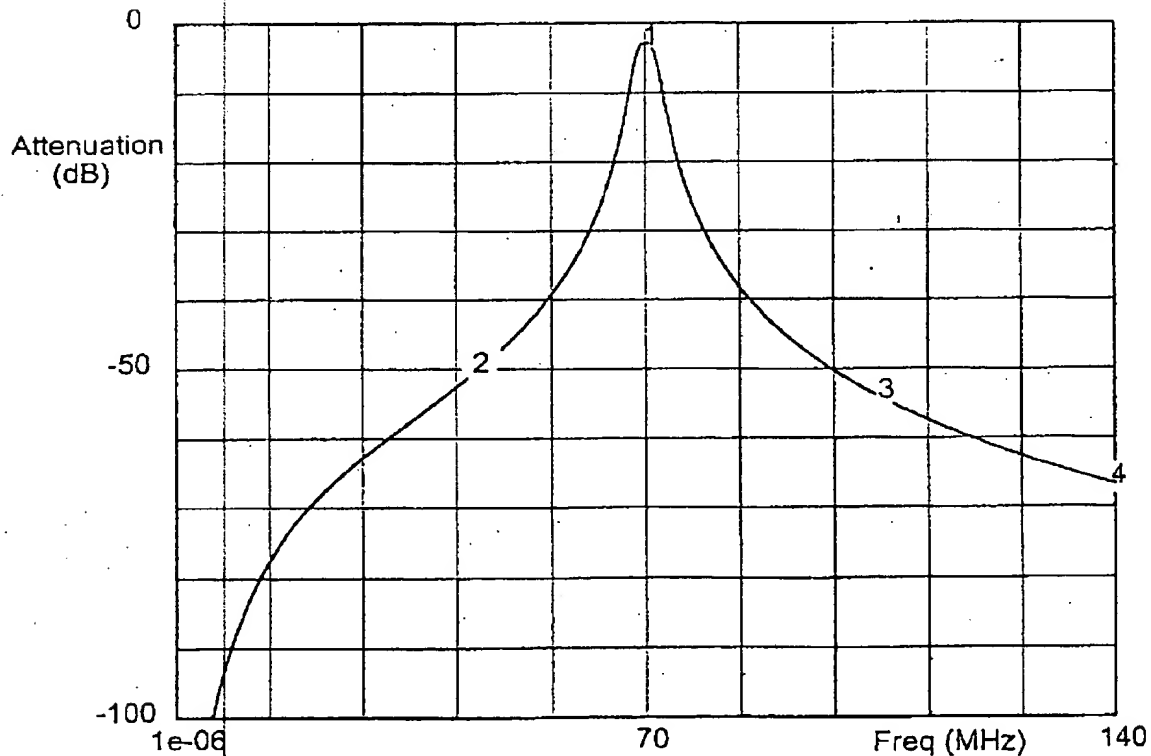


FIG. 11



— DB[S21]

Freq (MHz)	Attenuation (dB)
70	-2.7315
44.8	-50.2972
105	-54.2752
140	-66.7522

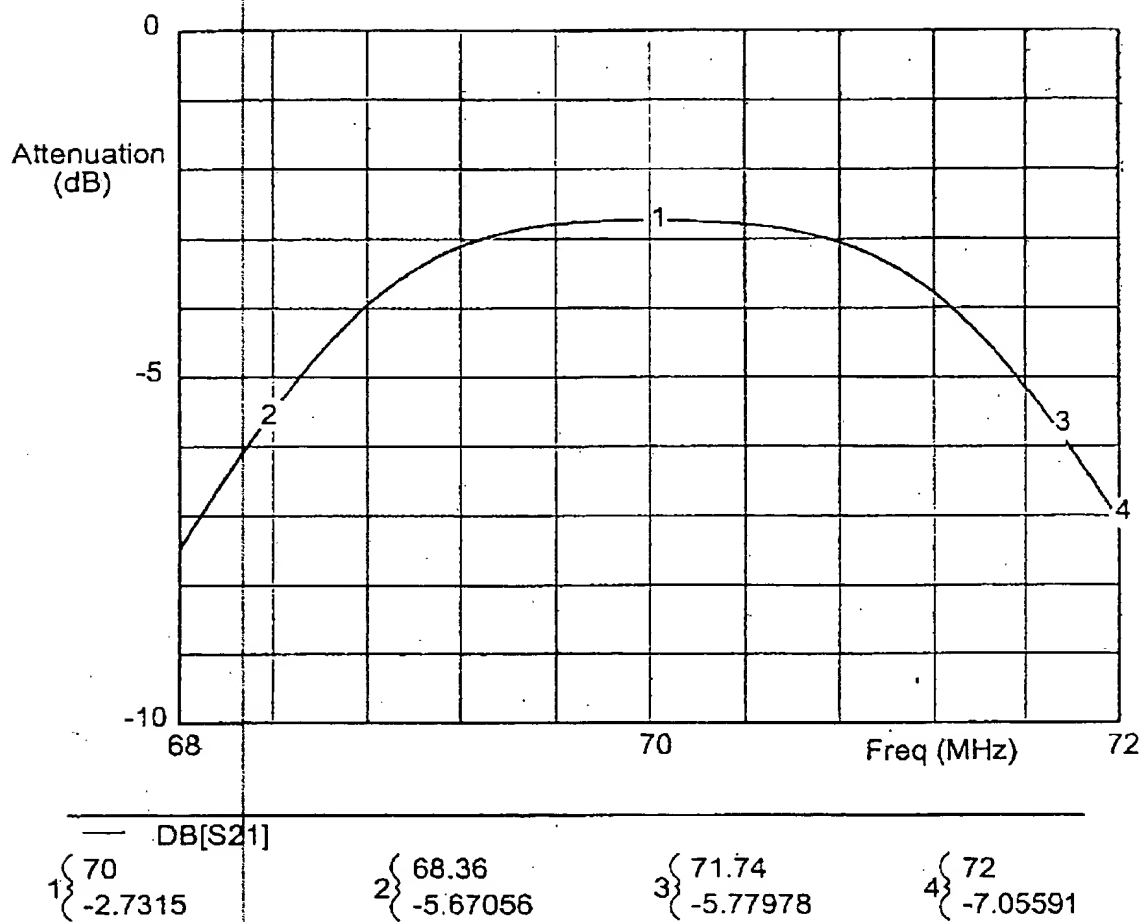


FIG. 12b

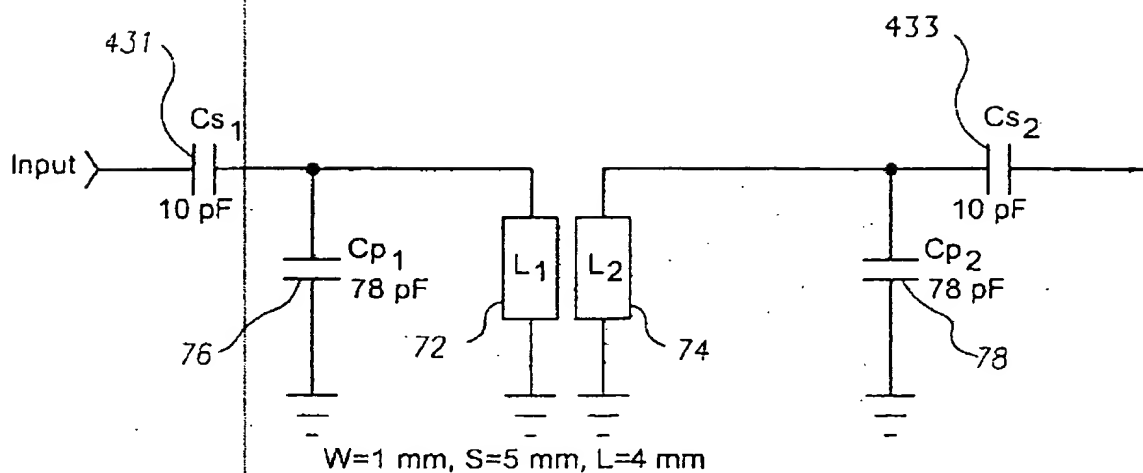
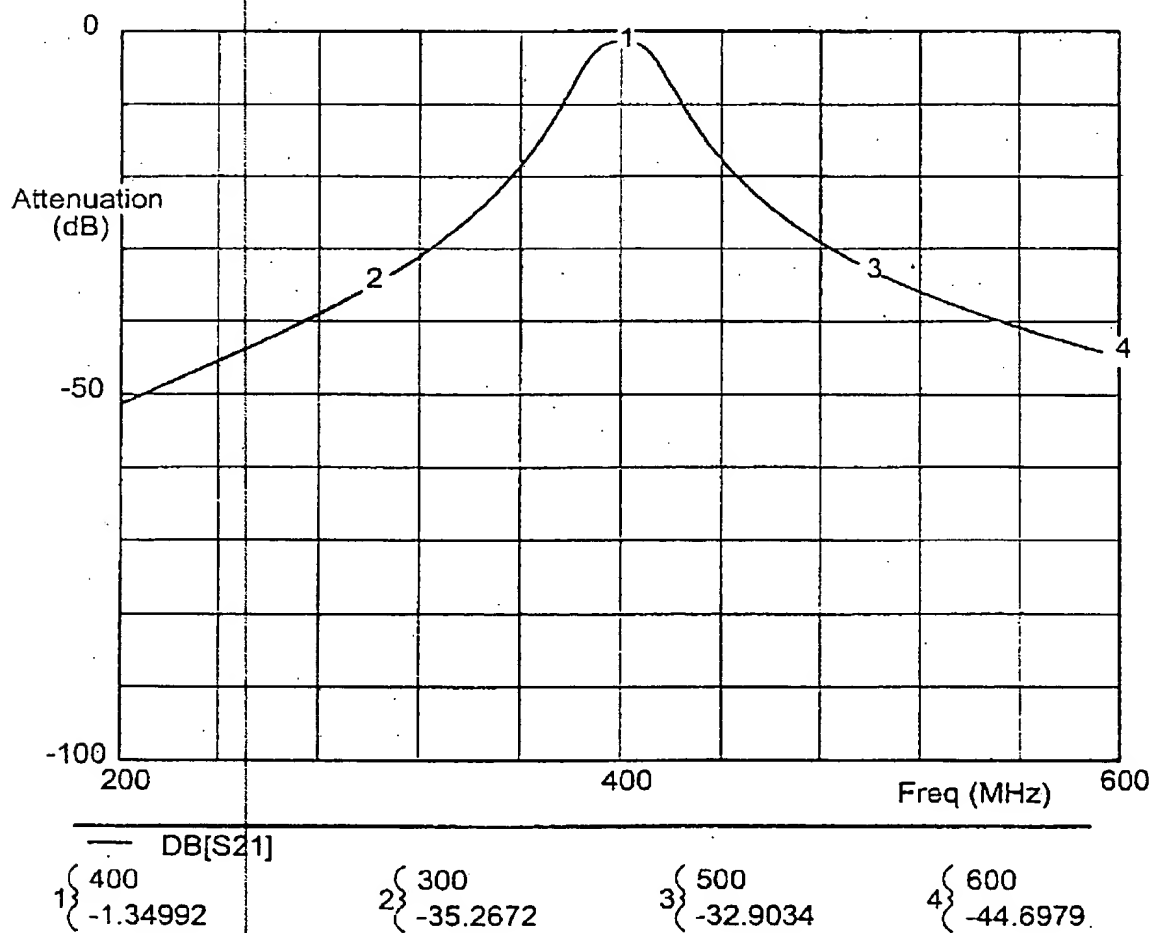


FIG. 13



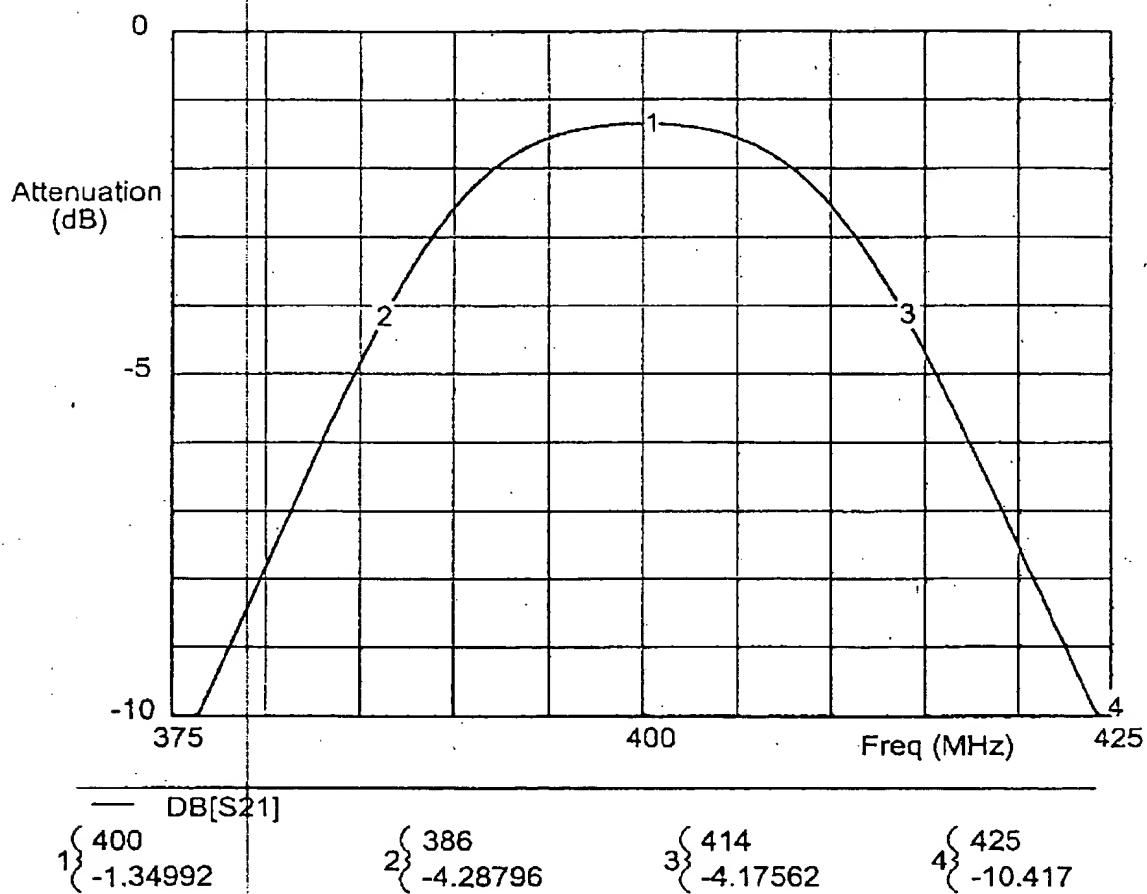


FIG. 14b

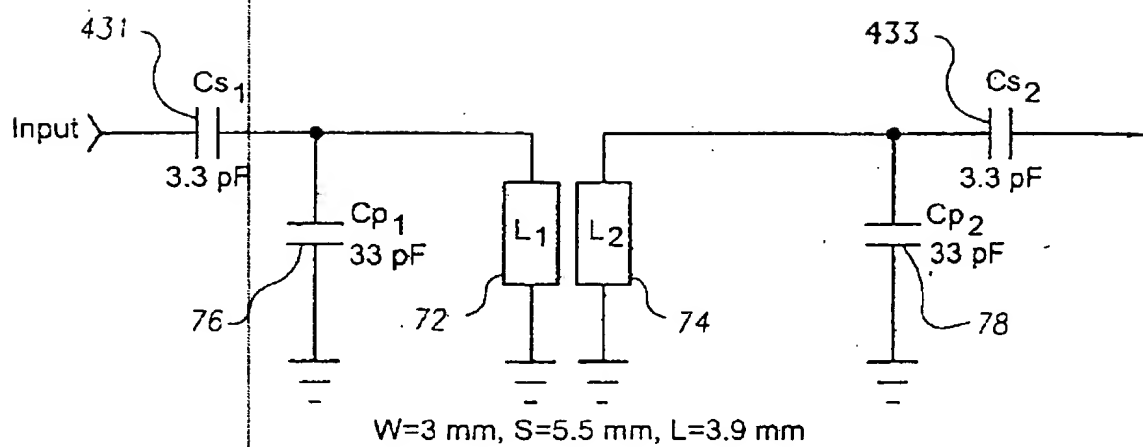
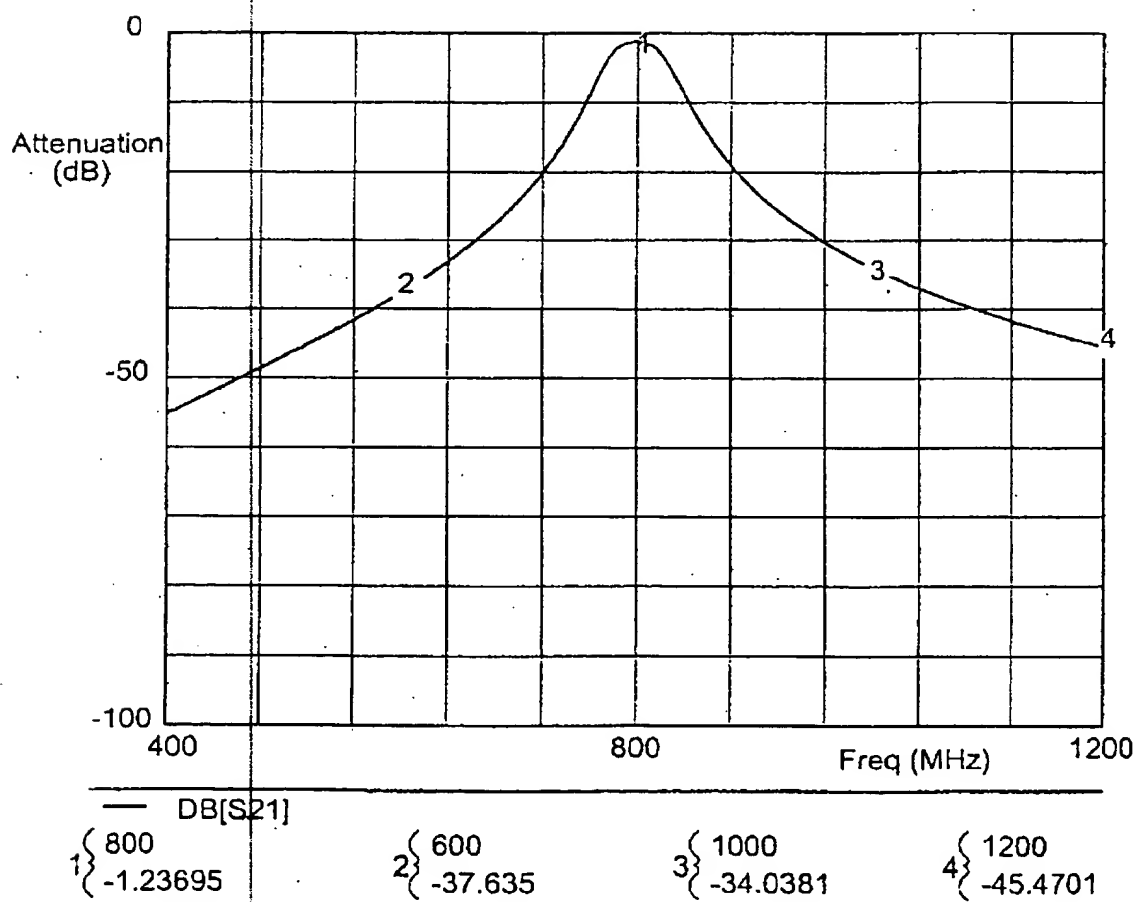


FIG. 15



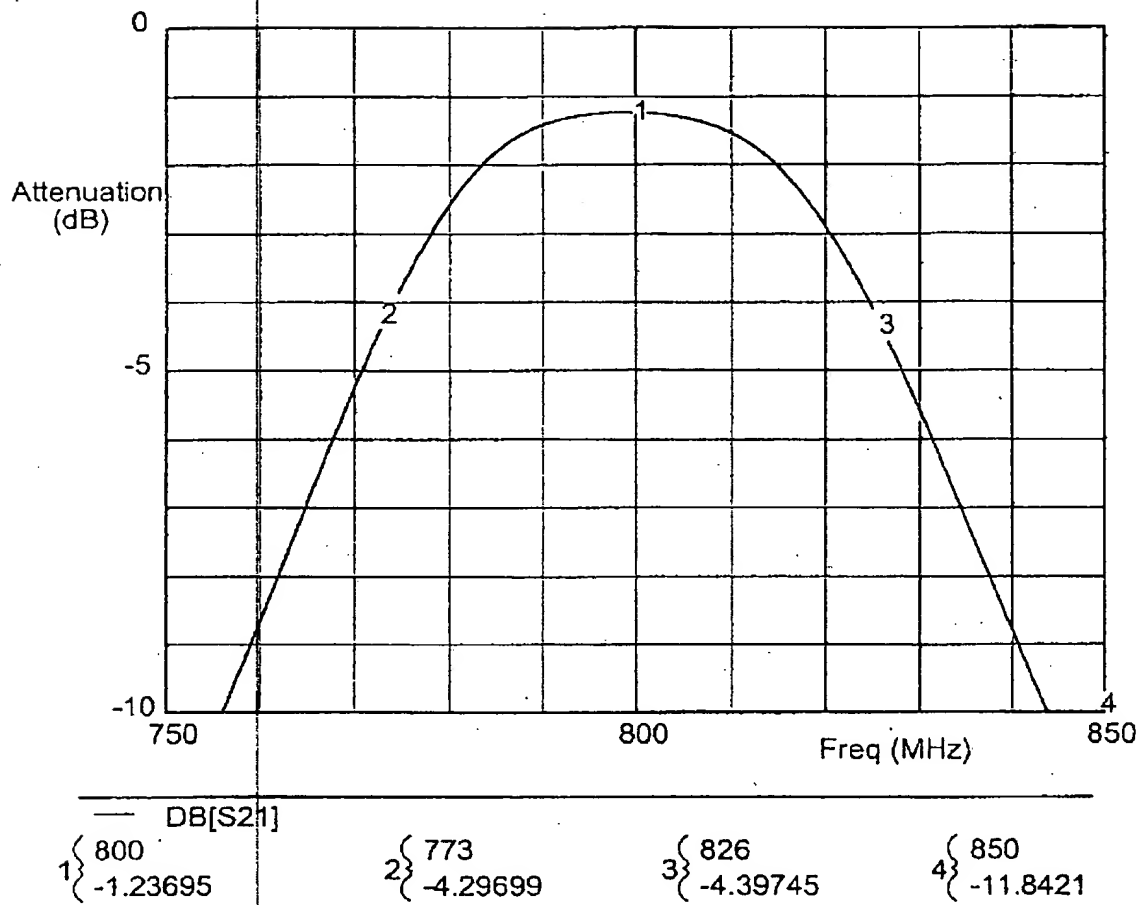
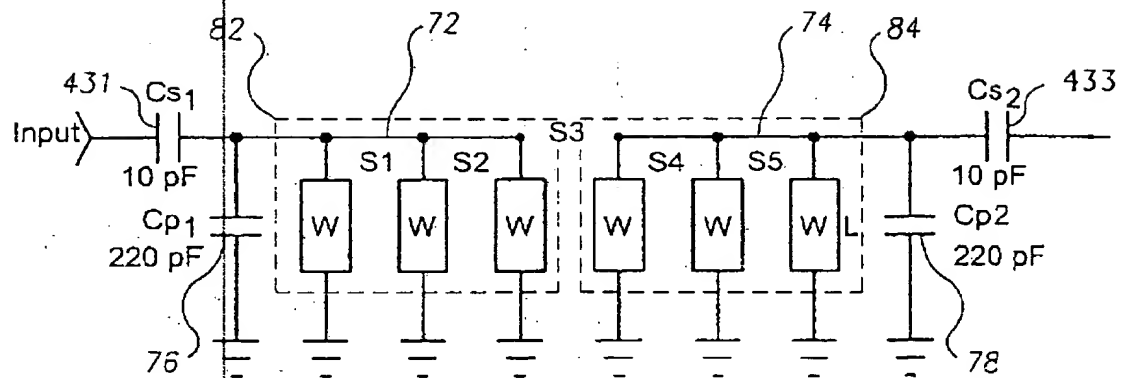
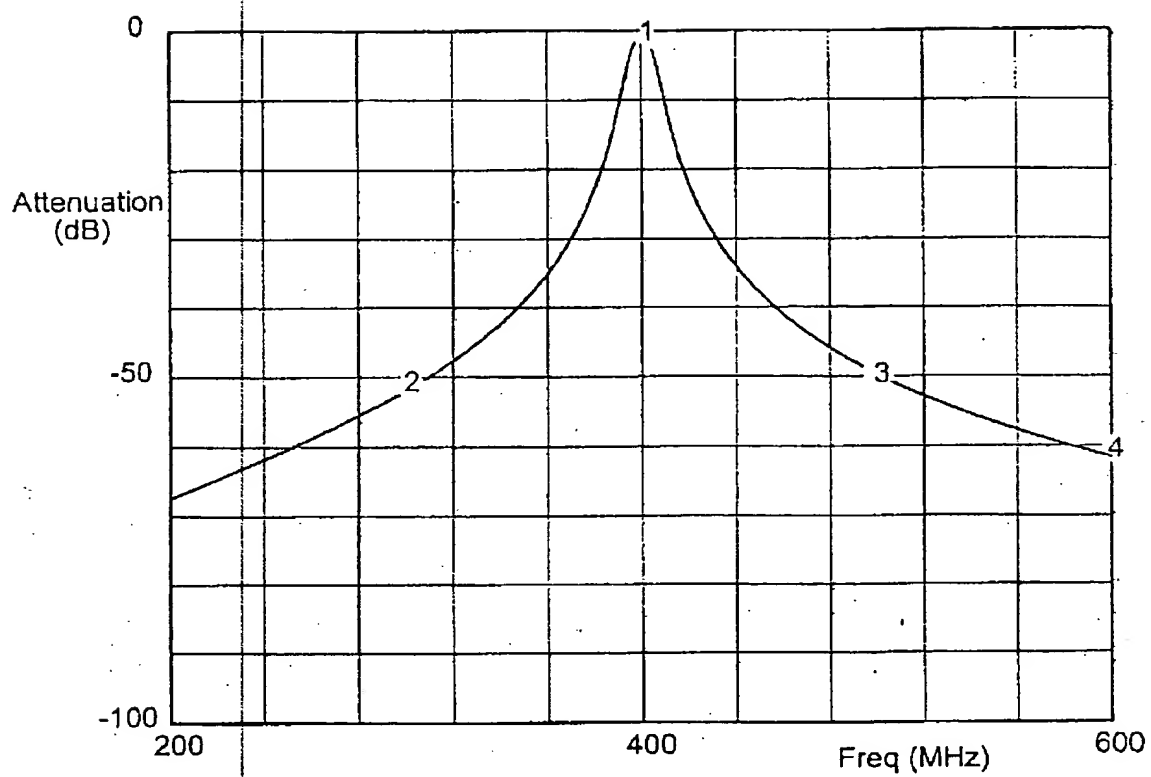


FIG. 16b



Multistrip_coupled microstrip
line(2 resonators, 3 lines each).
Width $W=2$ mm, Length $L=5.5$ mm
Gaps: $S1=S2=S4=S5=3.85$ mm
 $S3 = 4$ mm
Dielectric: $\epsilon_r=4.65$, $\tan\delta=0.001$
Board thickness (height) $H=1.5$ mm

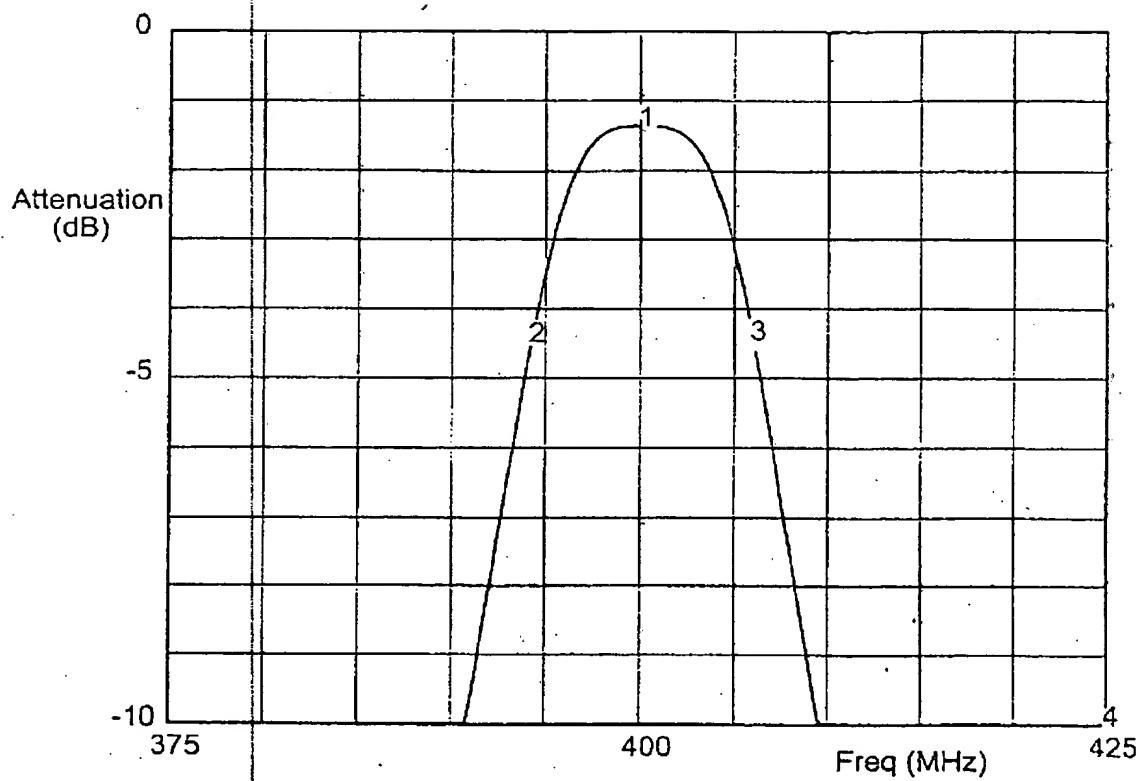
FIG. 17



— DB[S21]

1 { 400	2 { 300	3 { 500	4 { 600
-1.35185	-51.8681	-49.7486	-61.6452

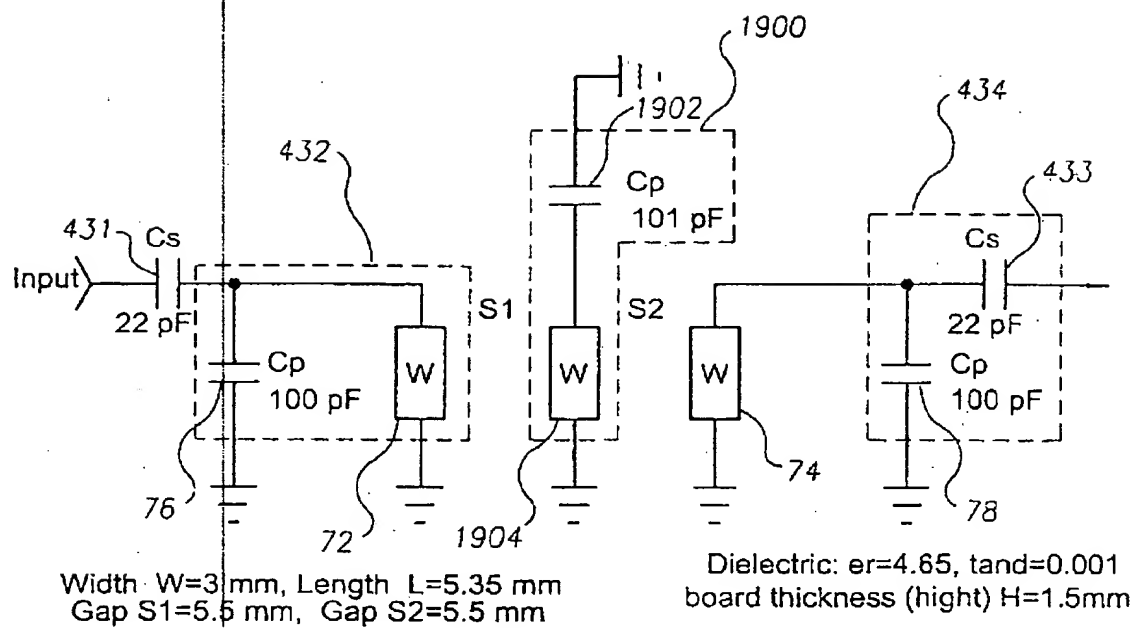
FIG. 18a



— DB[S21]

1 { 400
-1.351852 { 394.25
-4.475133 { 406
-4.439914 { 425
-26.022

FIG. 18b



Multiple_coupled microstrip line
(3coupled resonators in cascade)

FIG. 19

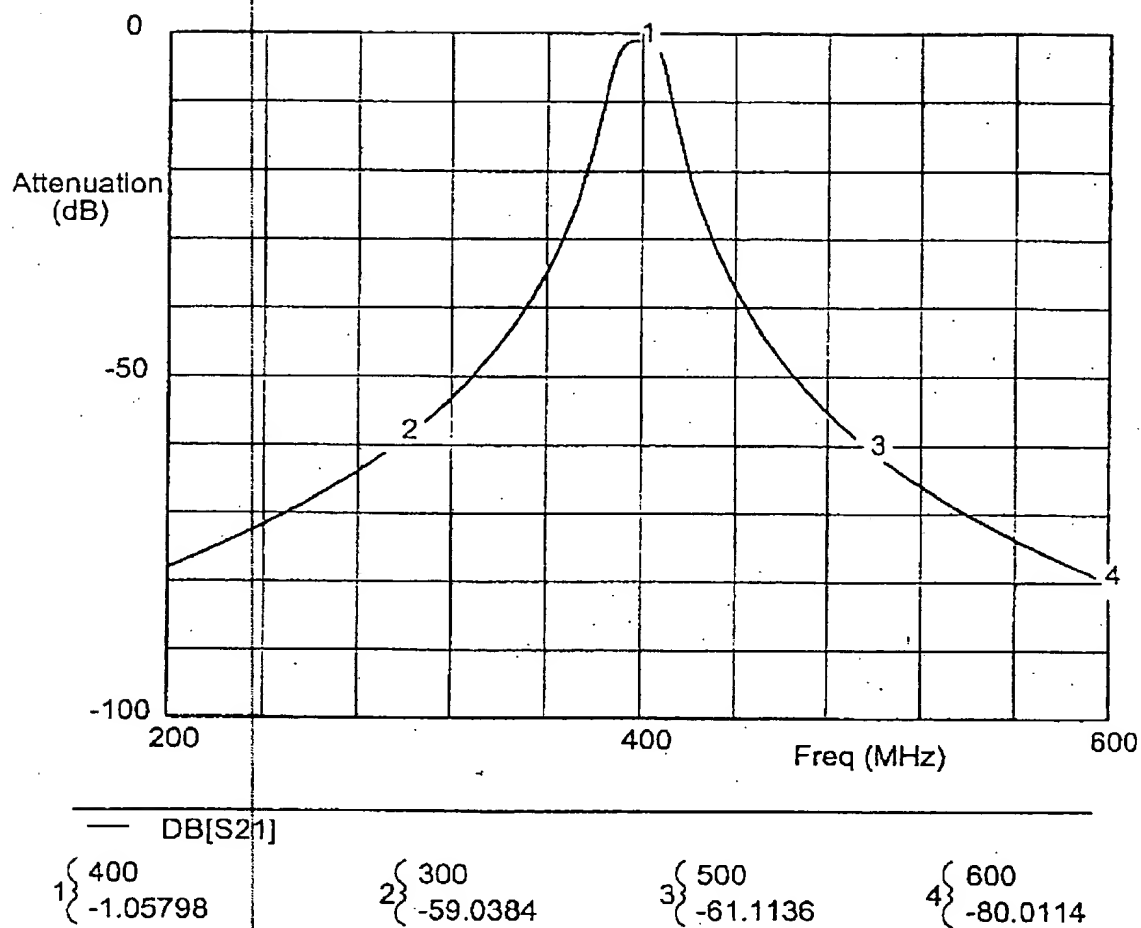
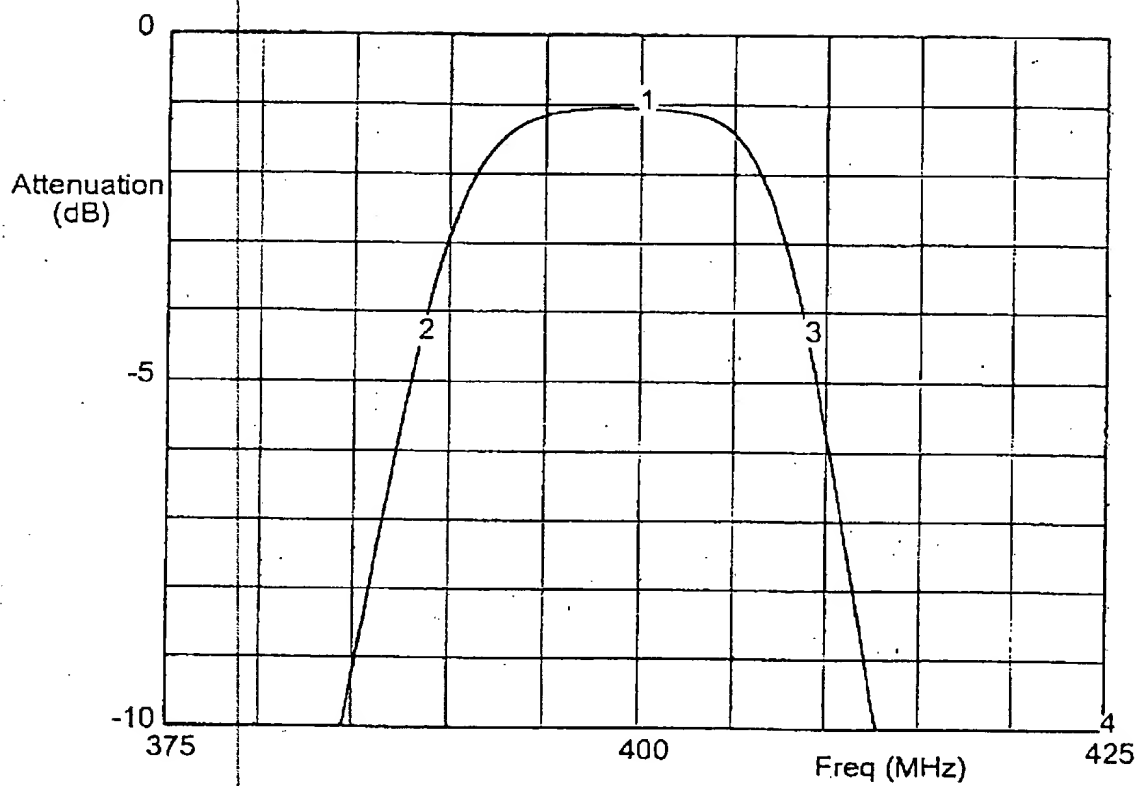


FIG. 20a



— DB[S21]

1 { 400	2 { 388.5	3 { 409	4 { 425
-1.05798	-4.38529	-4.3905	-25.5458

FIG. 20b

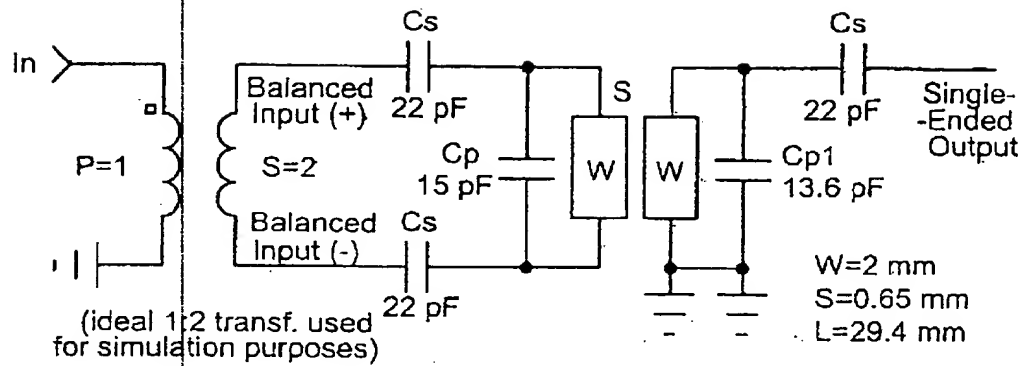


FIG. 21

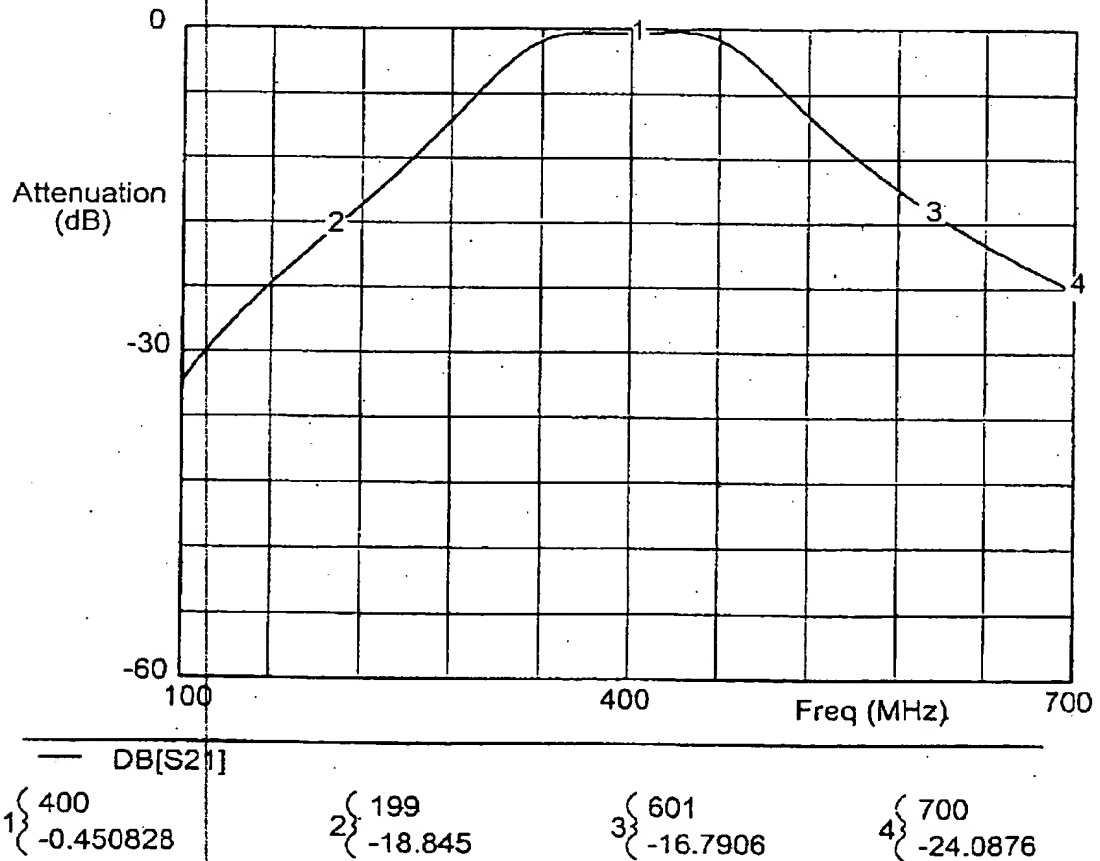


FIG. 22a

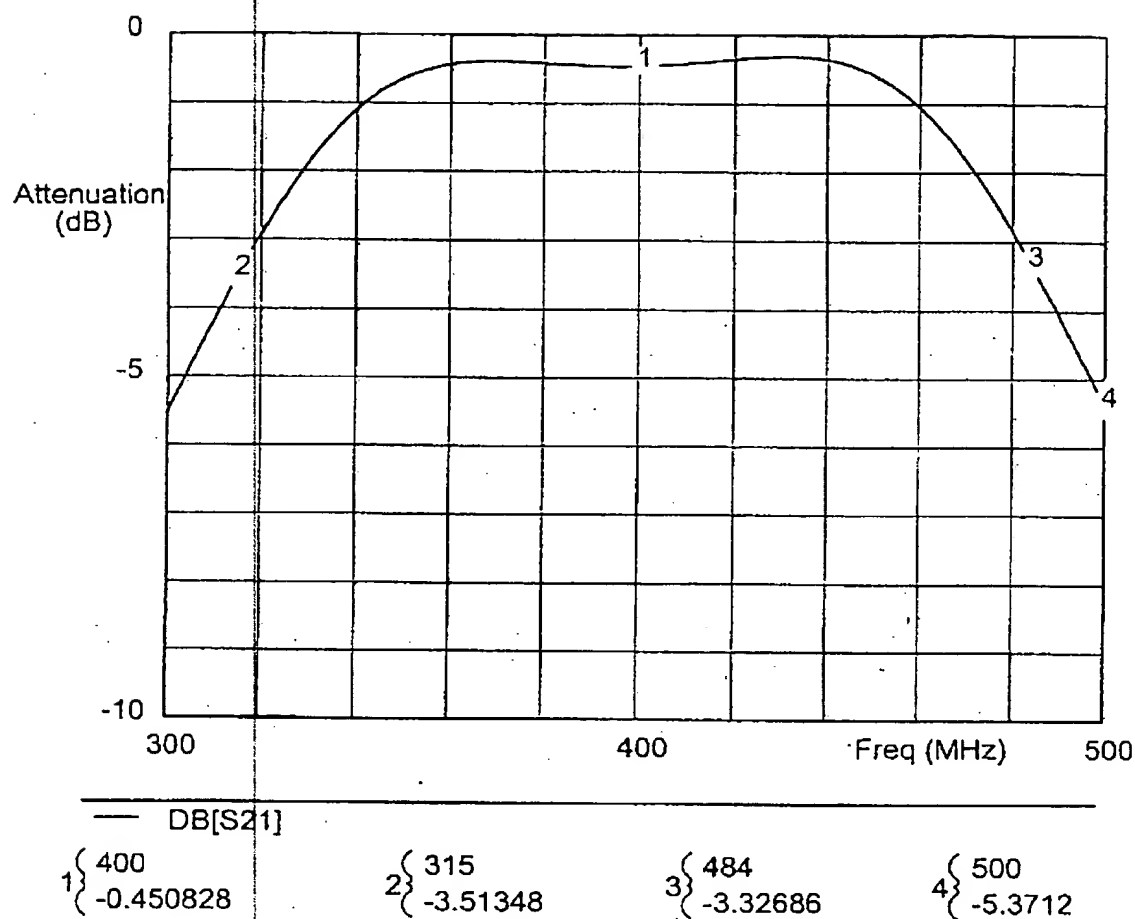


FIG. 22b

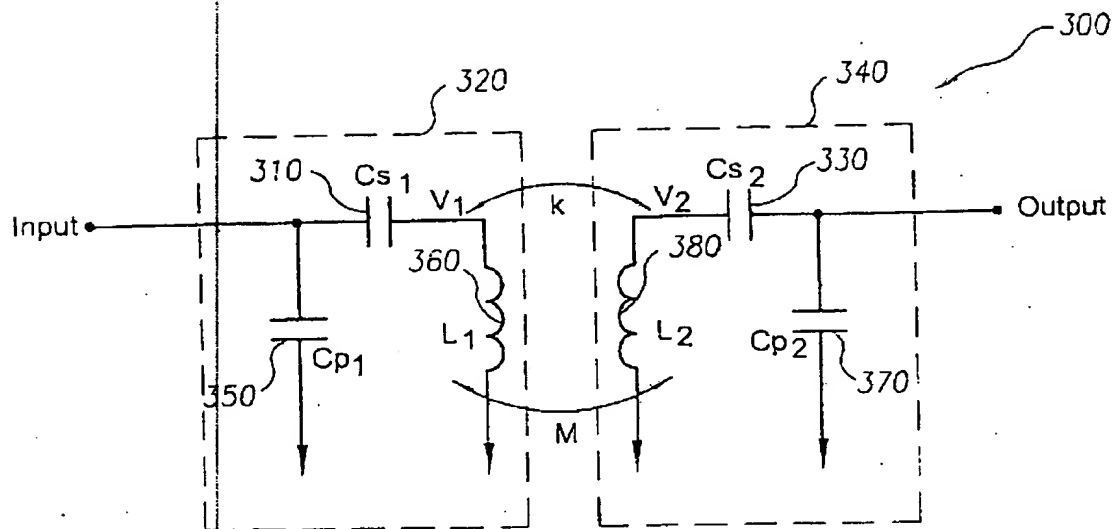


FIG. 23

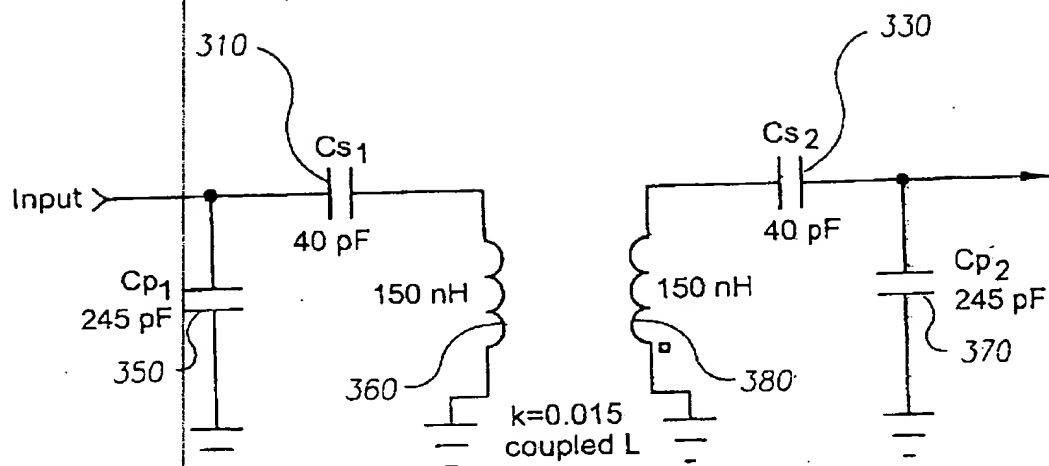
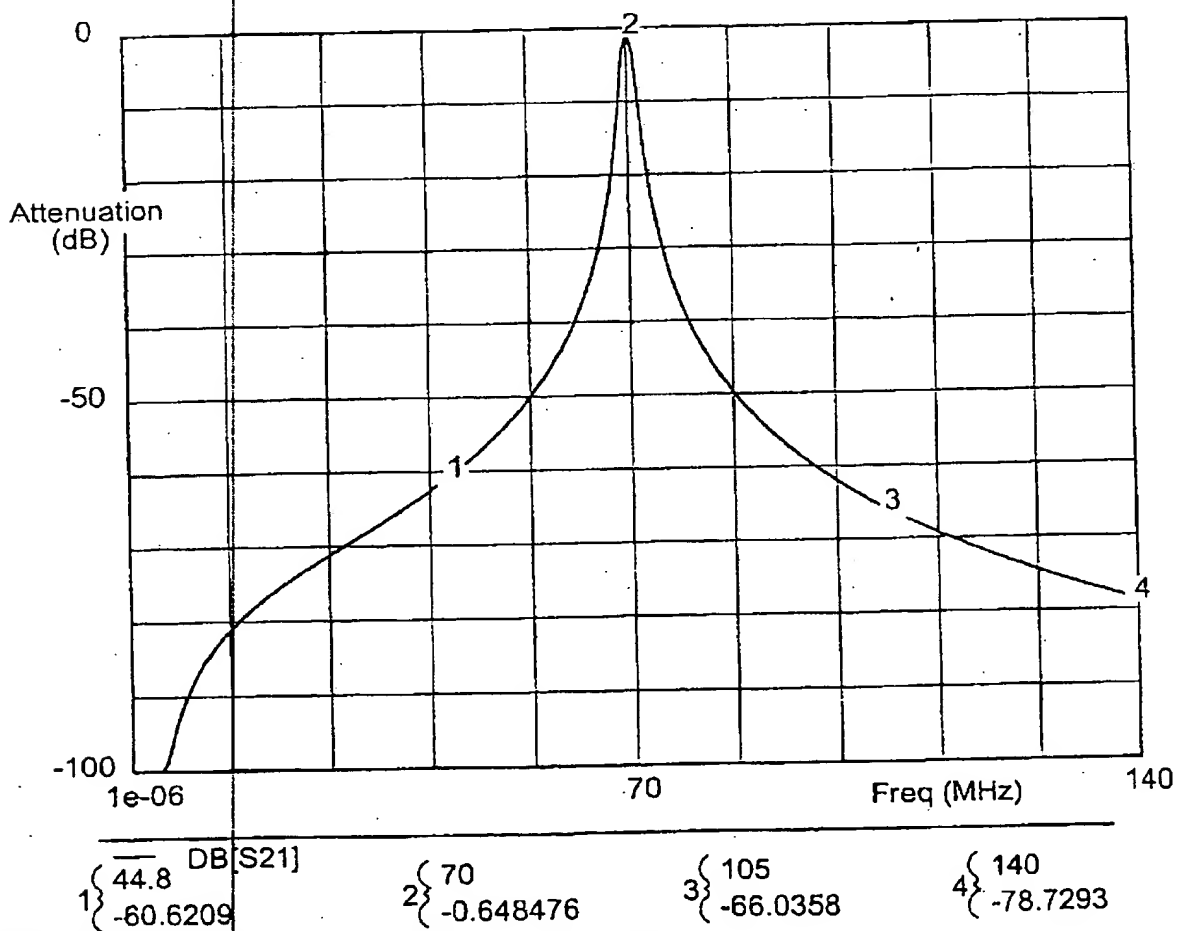


FIG. 24



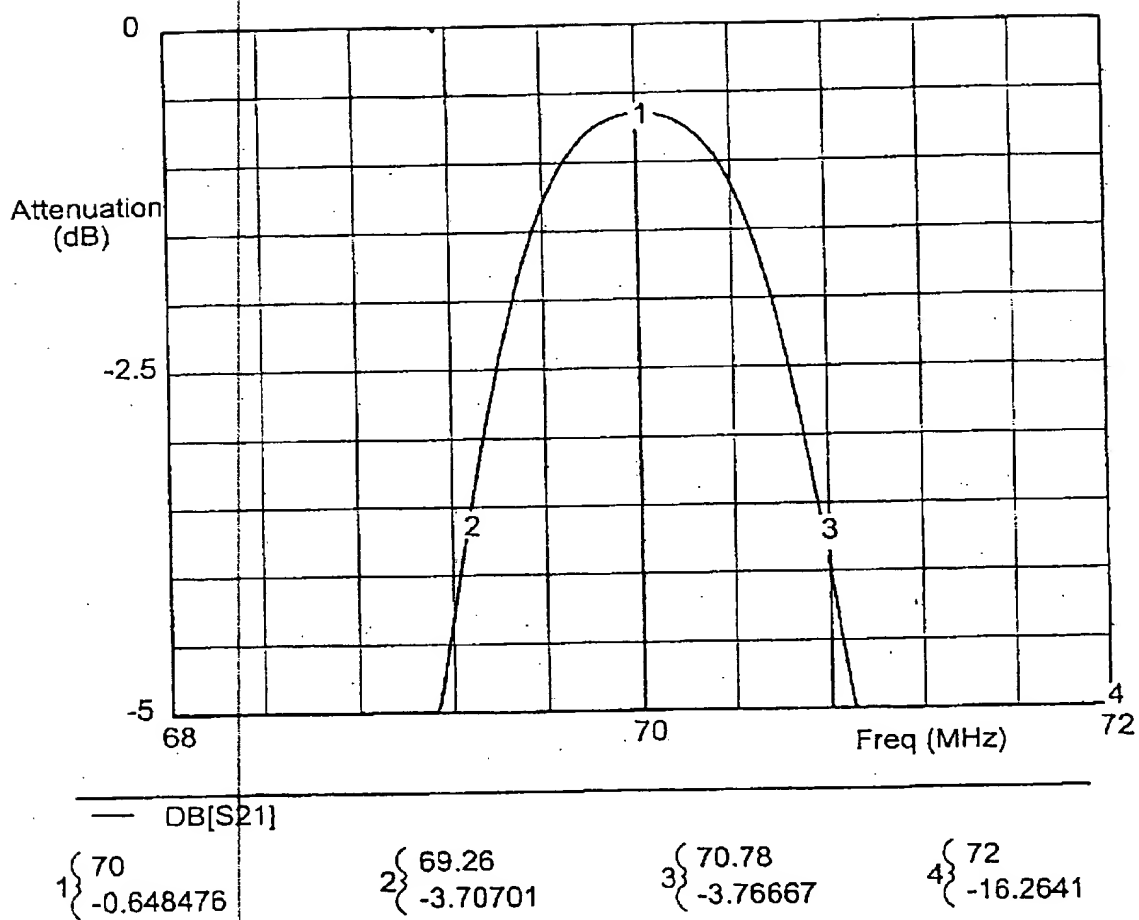


FIG. 25b

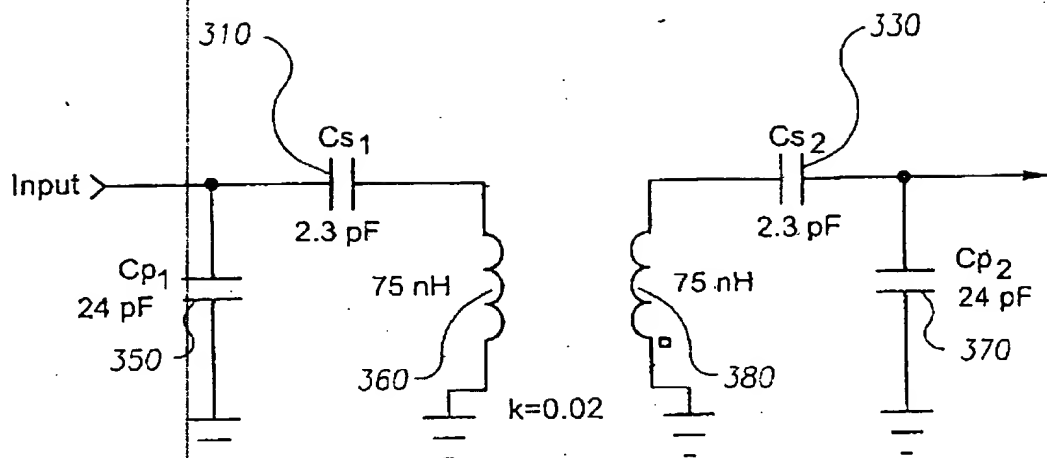
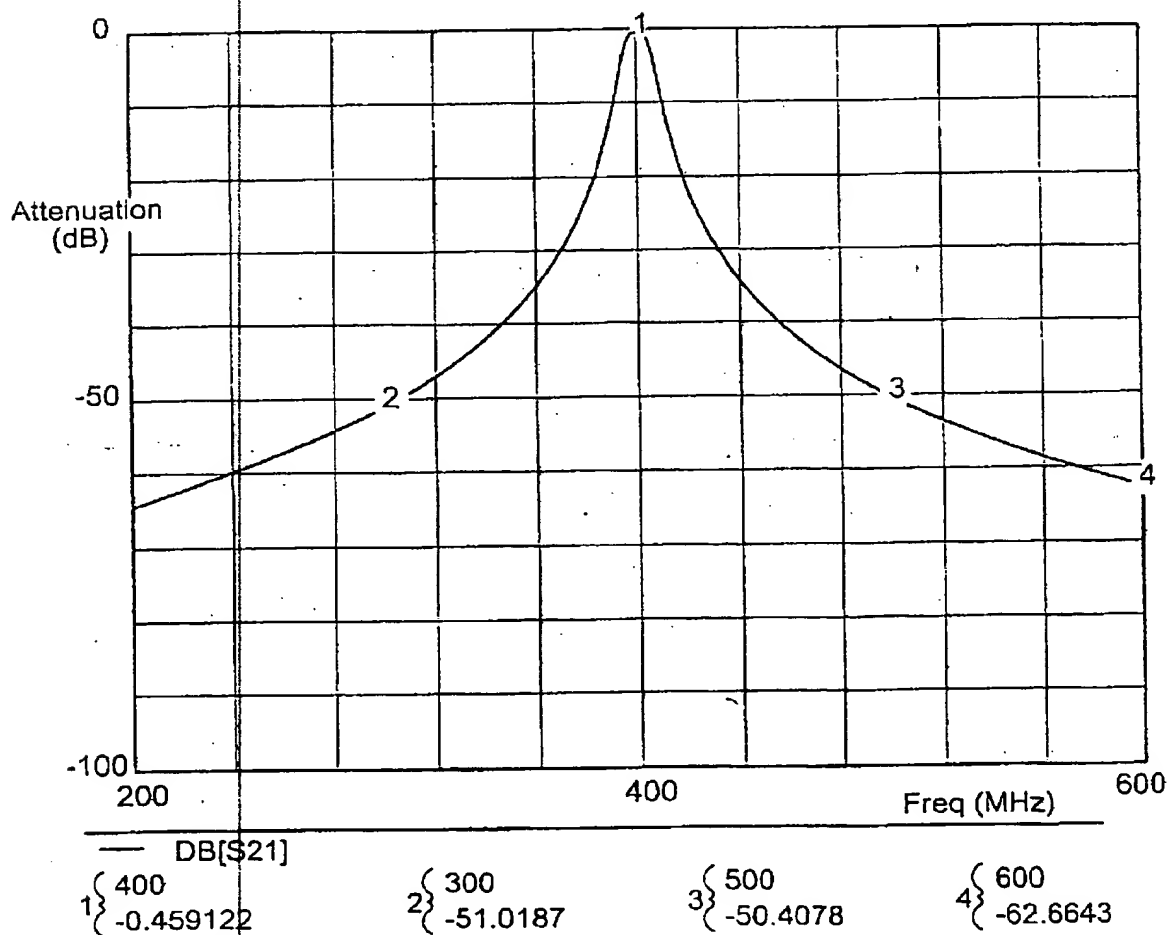


FIG. 26



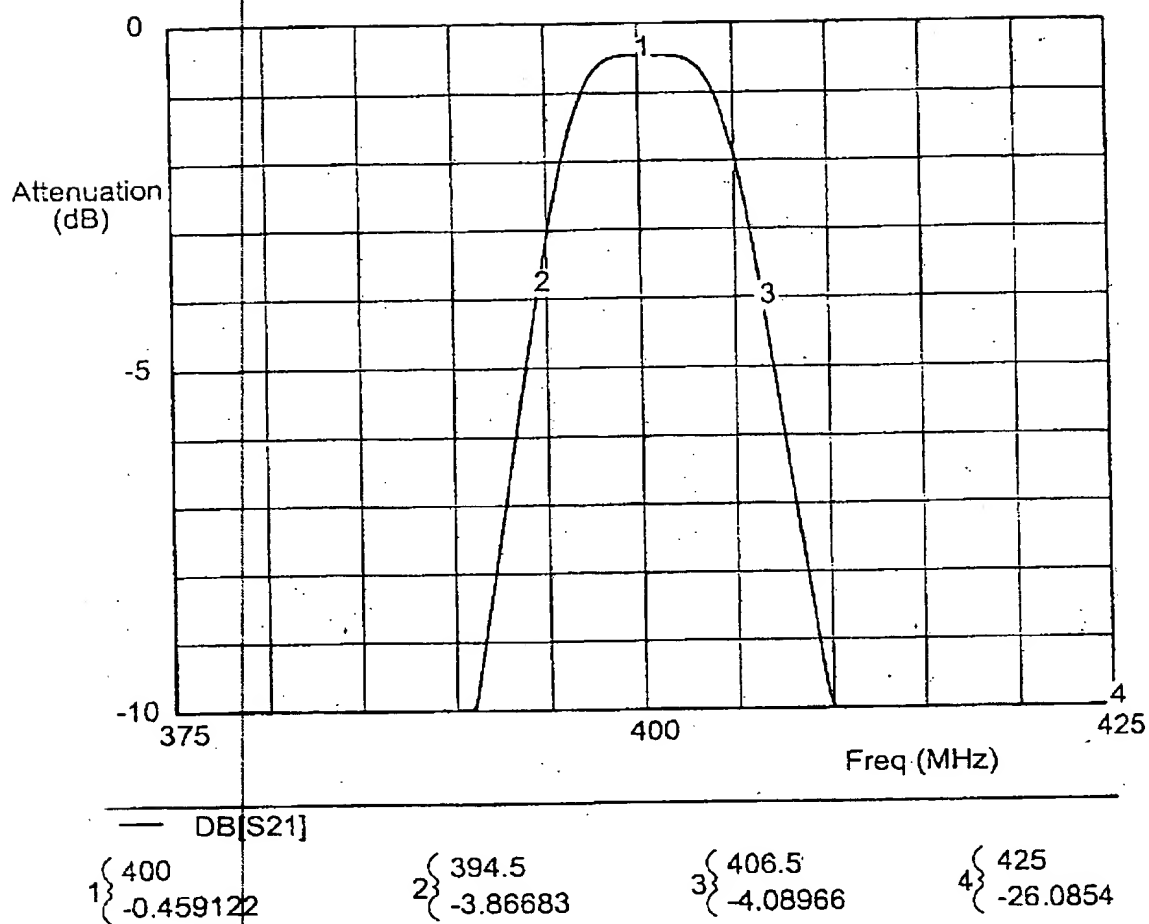


FIG. 27b

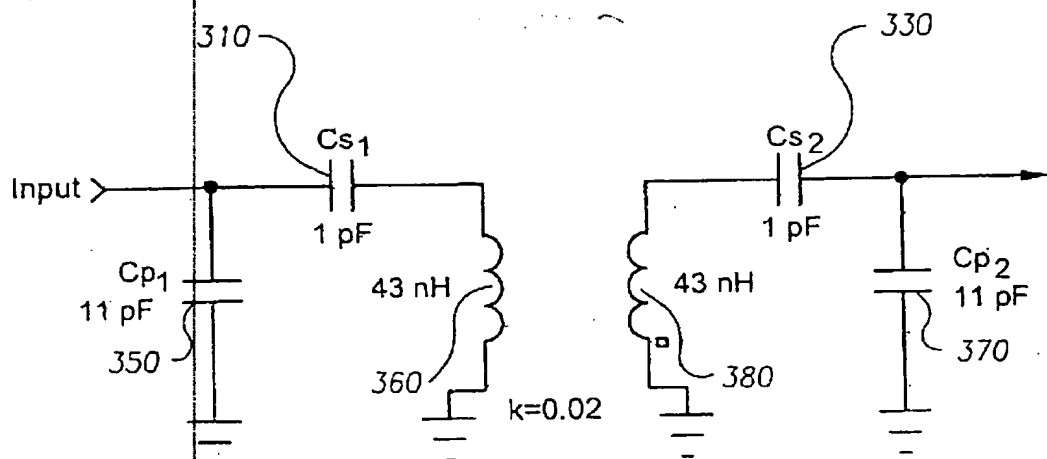
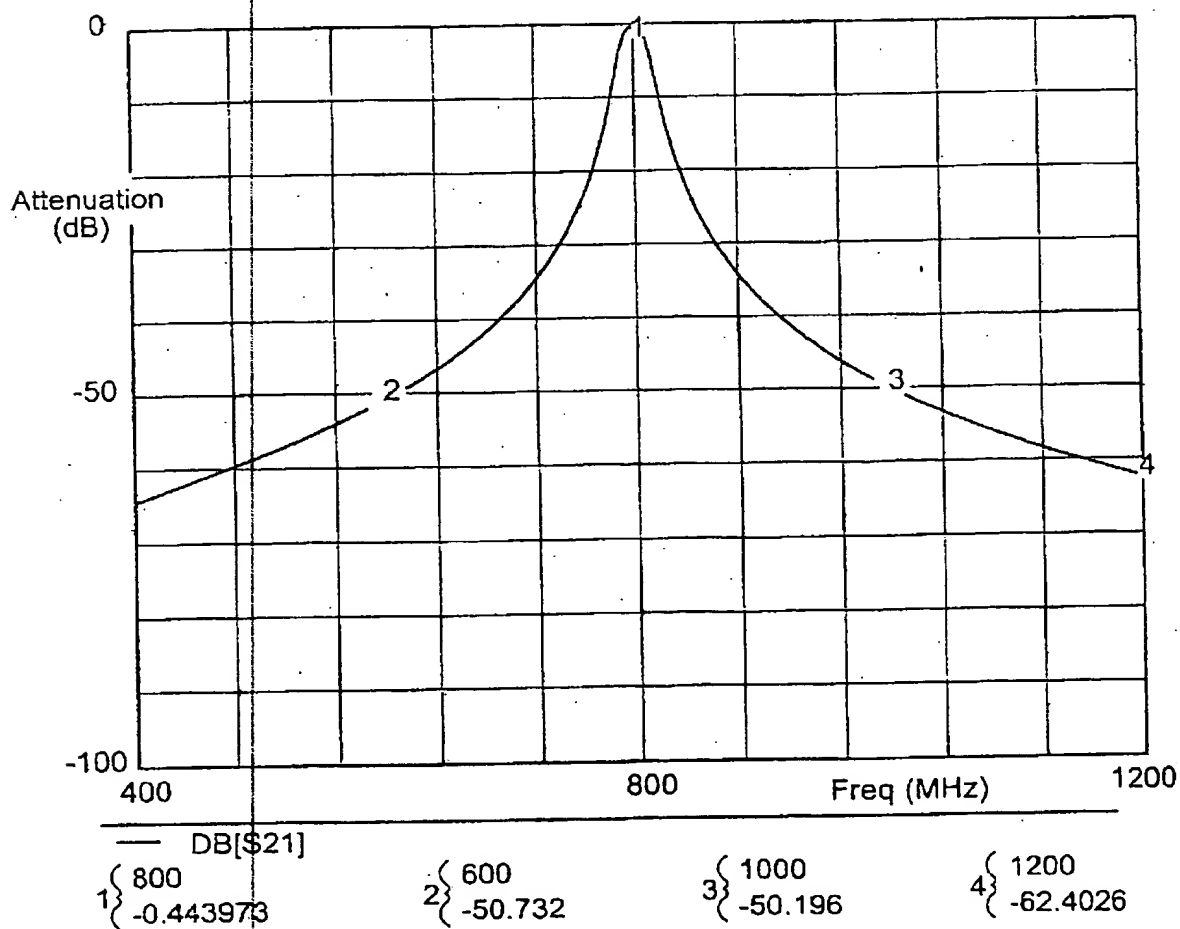
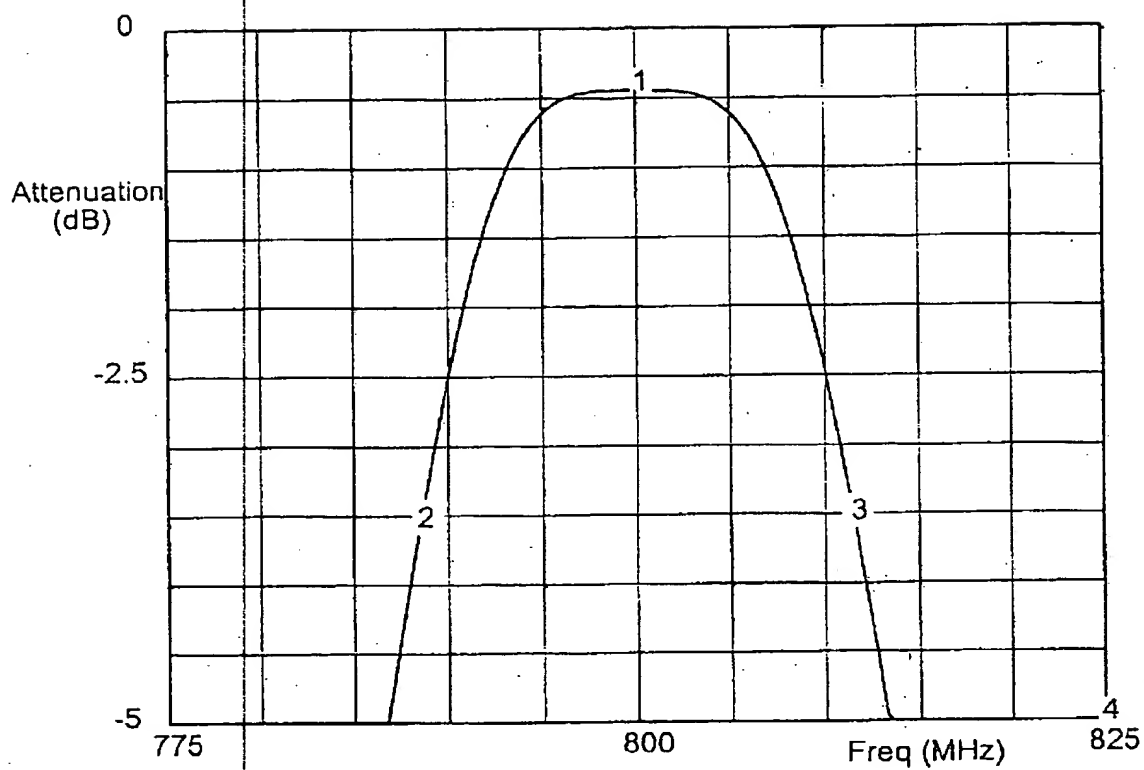


FIG. 28





DB[S21]			
1 { 800	2 { 788.5	3 { 811.5	4 { 825
-0.443973	-3.57842	-3.54287	-14.2697

FIG. 29b

Equivalent Inductance of Micro-Strip transmission lines used in example filters					
Dielectric constant = 4.65; Height = 1.5mm; Copper thickness: 0.018mm					
Filter Example #	Filter Center Frequency (MHz)	Length of uStrip line (mm)	Width of uStrip line (mm)	Percentage of wave-length (%)	Equivalent Inductance of uStrip line (nH)
4	70	12.25	1.5	0.6	6.1
5	400	4	1	1.1	2.4
6	500	3.9	3	2.3	1.3
7	400	5.36	3	1.5	1.8
8 (multiple microstrip lines connected in parallel)	400	5.5	3 lines connected in parallel each 2mm wide	1.8	(2.4 nH each) 0.72nH total (see note)
9	400	29.4	2	8.5	14
10 (multiple microstrip lines connected in parallel)	400	5.5	3 lines connected in parallel each 2mm wide	1.5	(2.4 nH each) 0.72nH total (see note)
Note: Adding more microstrip lines connected in parallel (multistrip lines), very low inductance values, in order of 0.5 nH, of high accuracy and repeatability are achievable. Considering the achievable tolerances in manufacturing (length and width of the lines), a tolerance of +/-2% of the inductance value of the multistrip lines is possible.					

FIG. 30

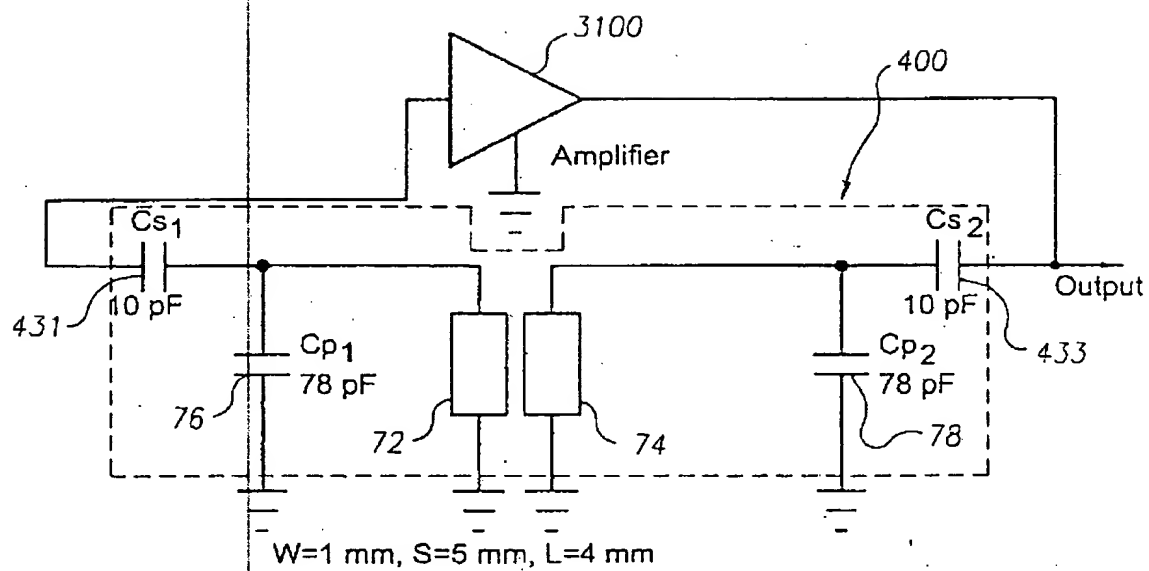


FIG. 31

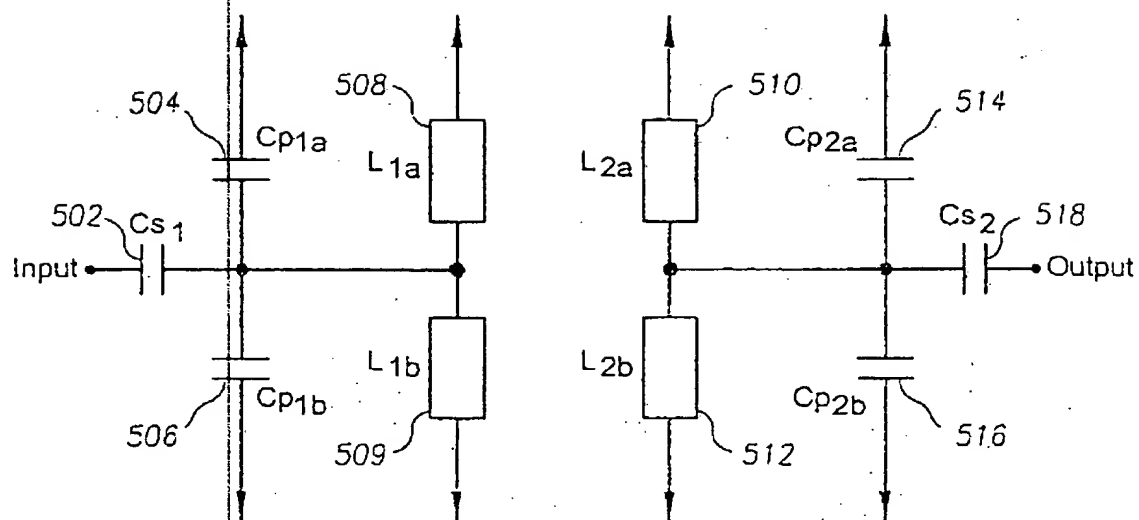


FIG. 32a

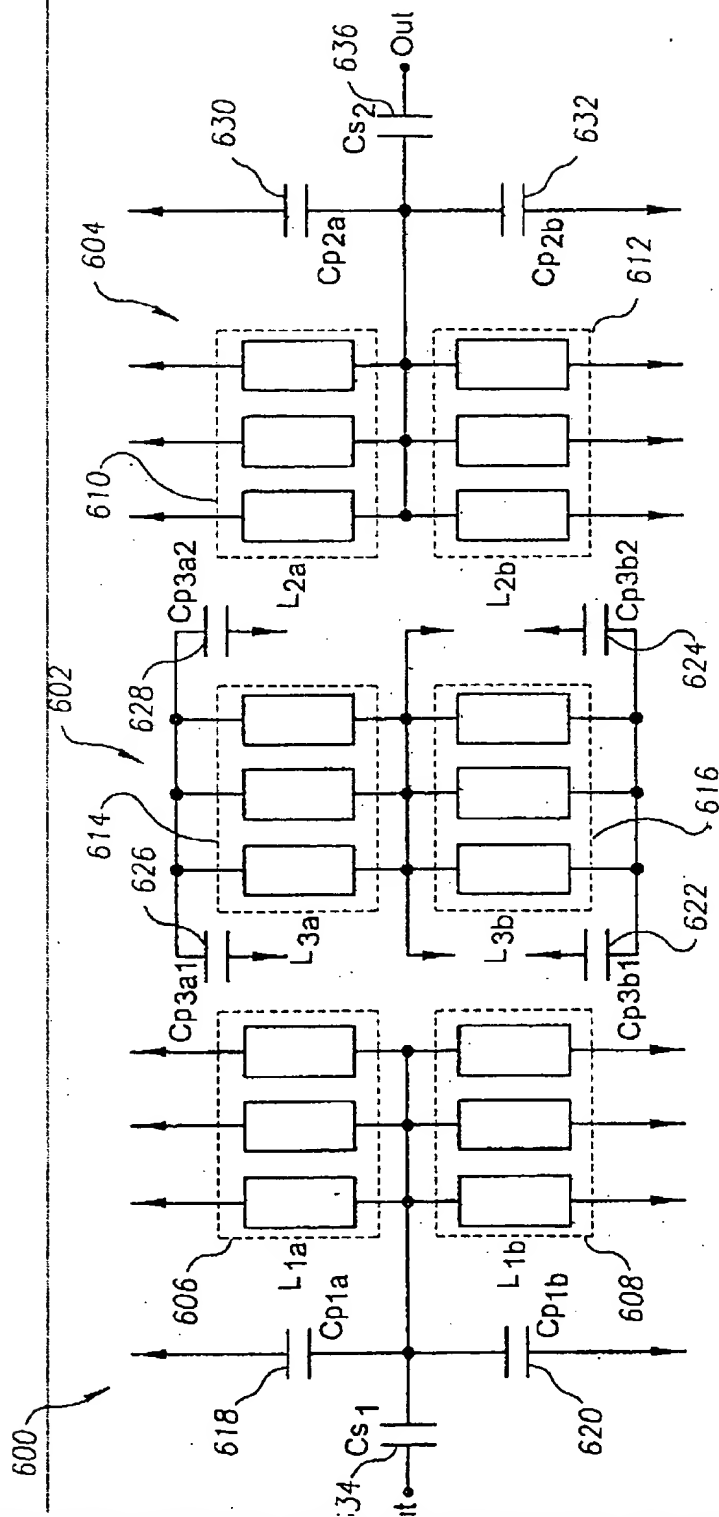
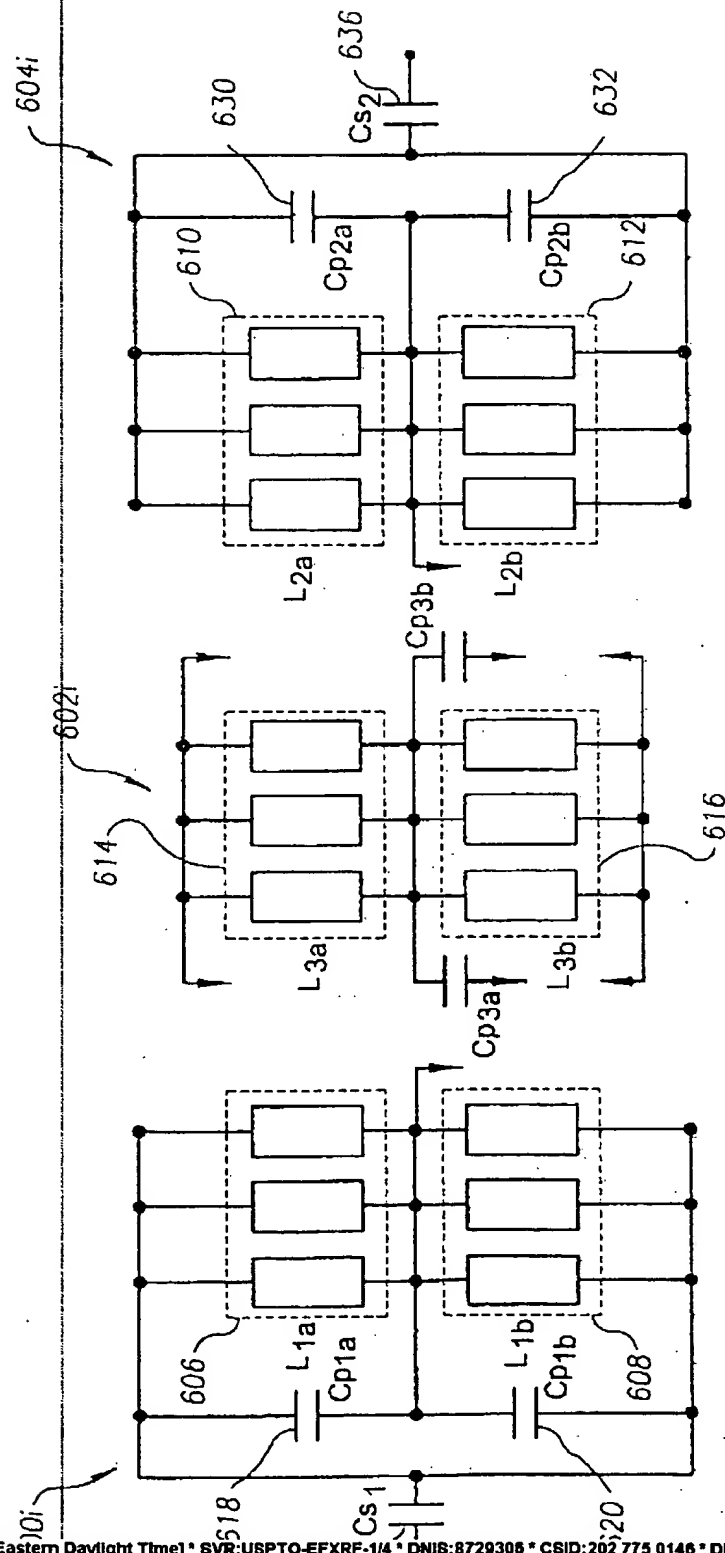


FIG. 32b



G. 32c

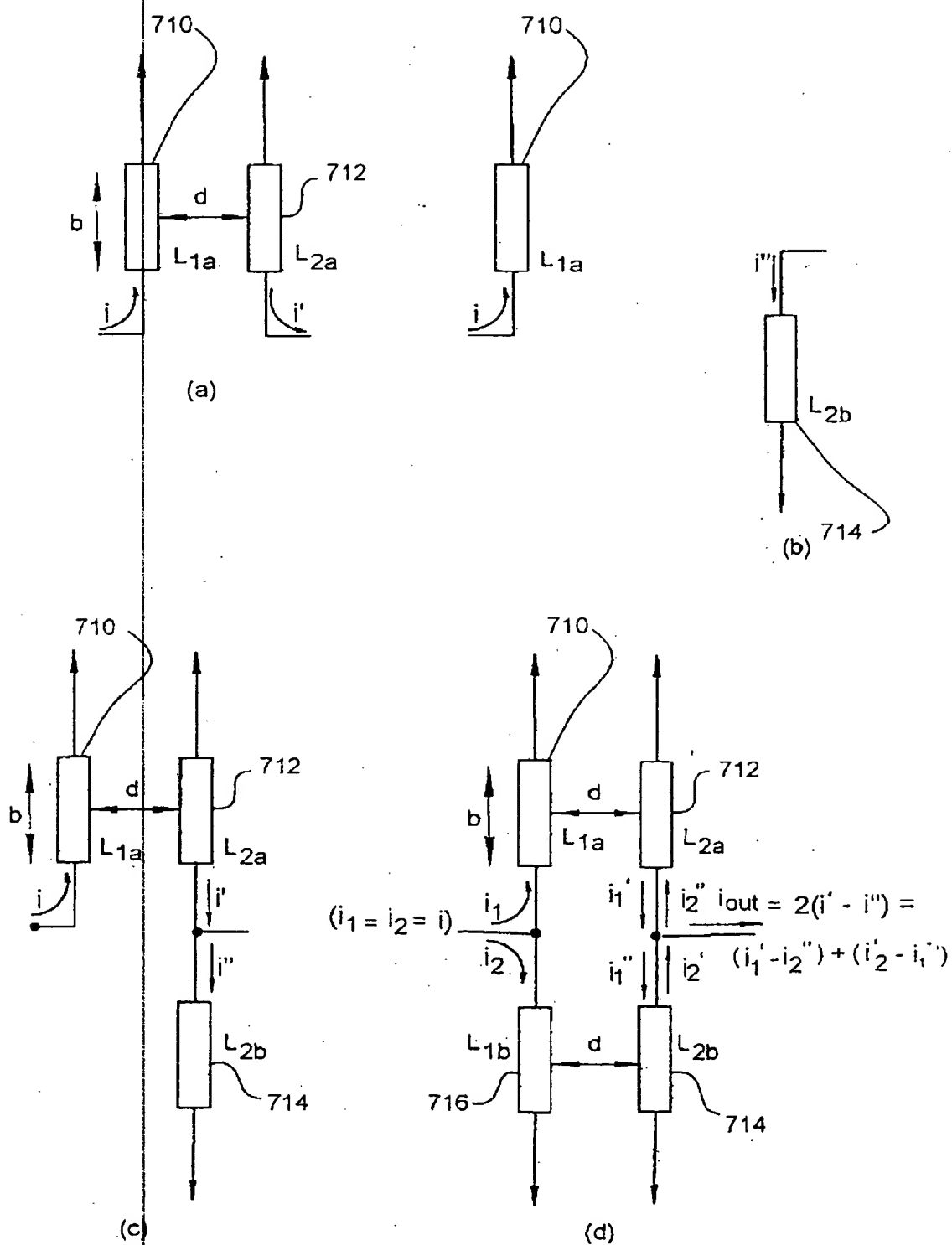
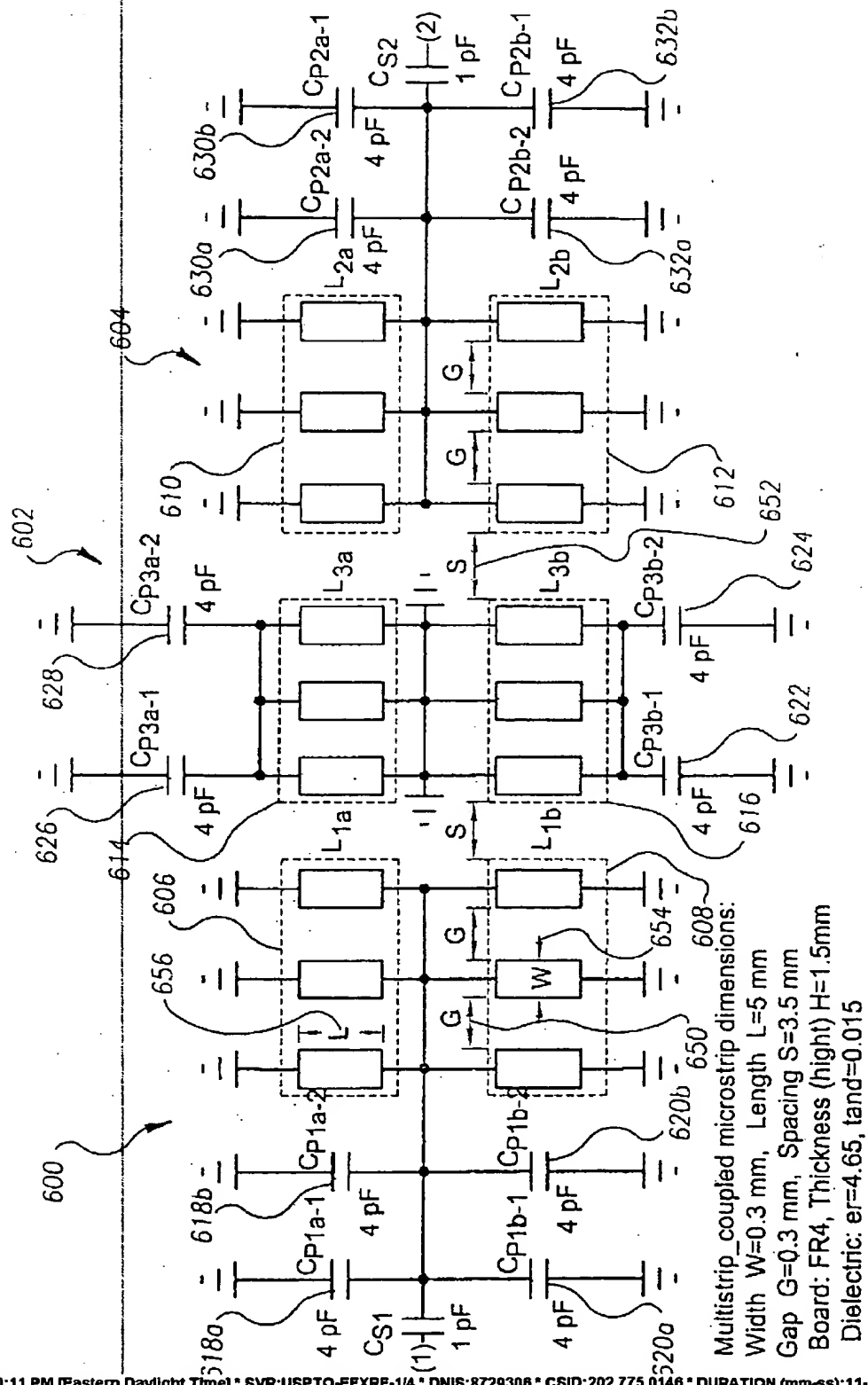


FIG. 33



Multistrip coupled microstrip dimensions:

Width $W=0.3$ mm, Length $L=5$ mm

Gap $G=0.3$ mm, Spacing $S=3.5$ mm

Board: FR4, Thickness (height) $H=1.5\text{mm}$

Dielectric: $\epsilon_r=4.65$, $\tan\delta=0.015$

IG. 34a

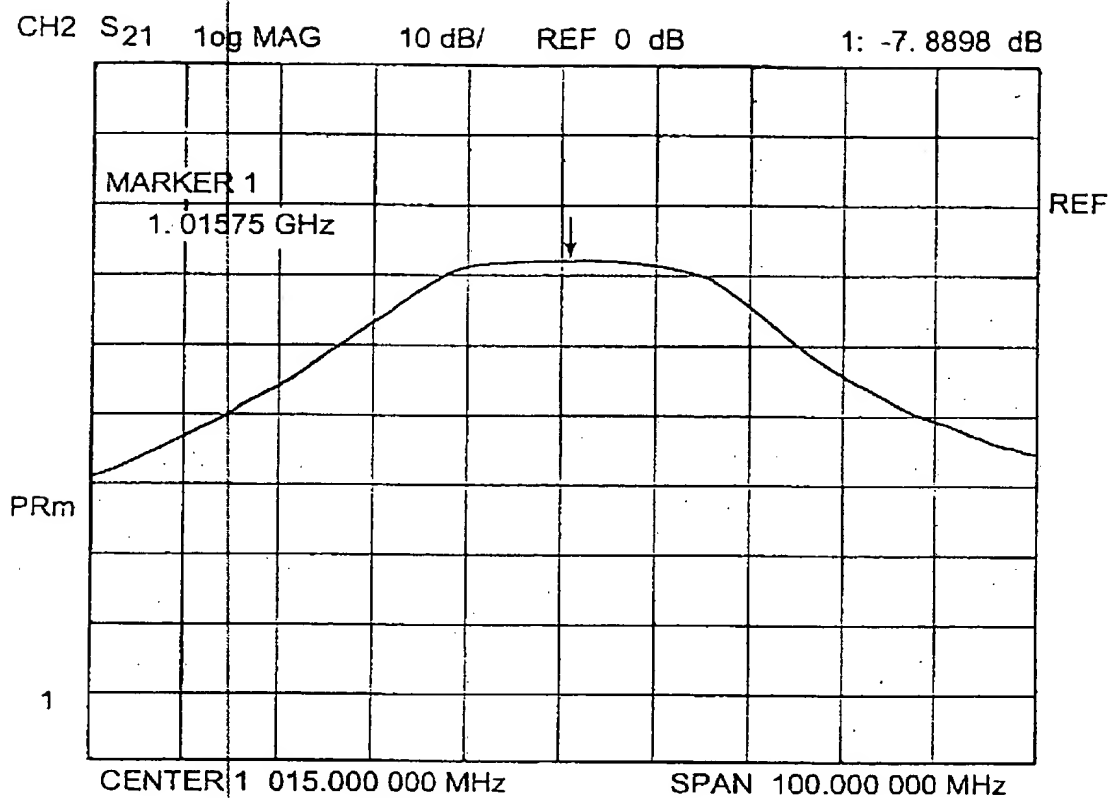


FIG. 34b

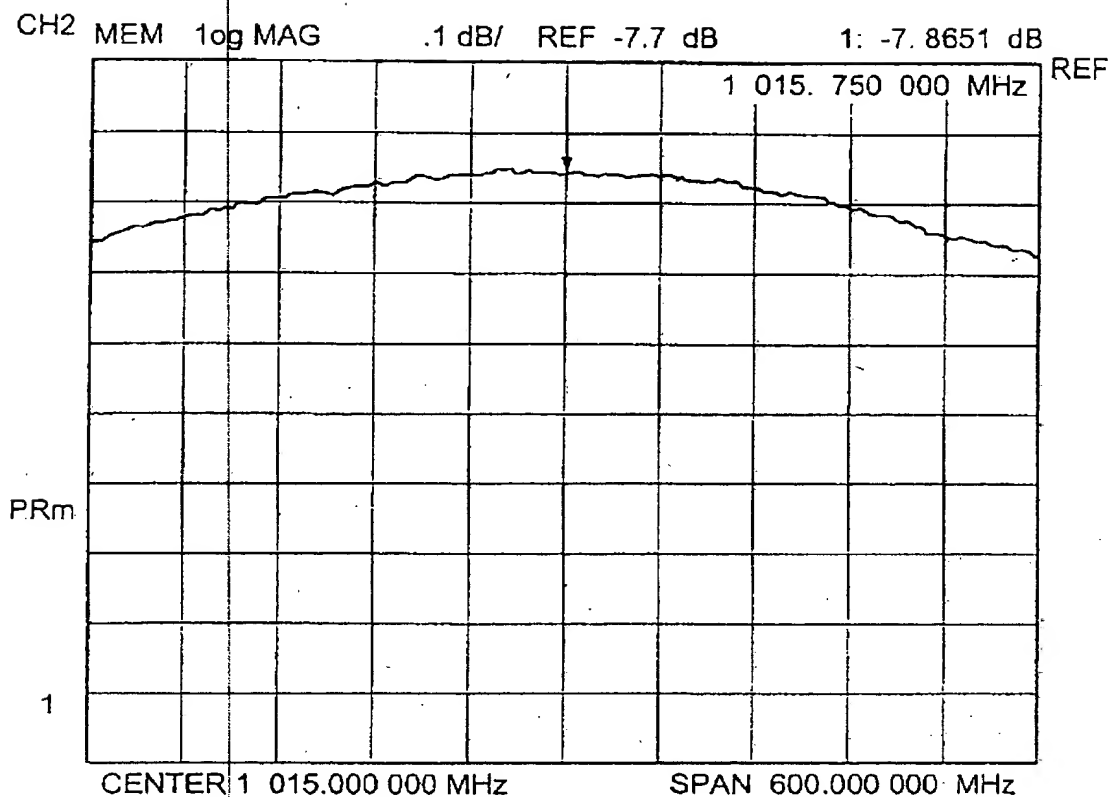


FIG. 34c

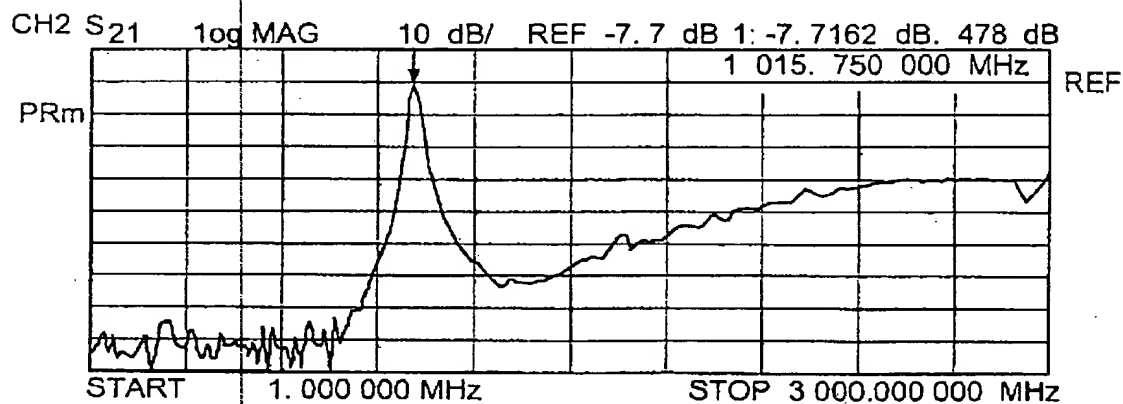


FIG. 34d

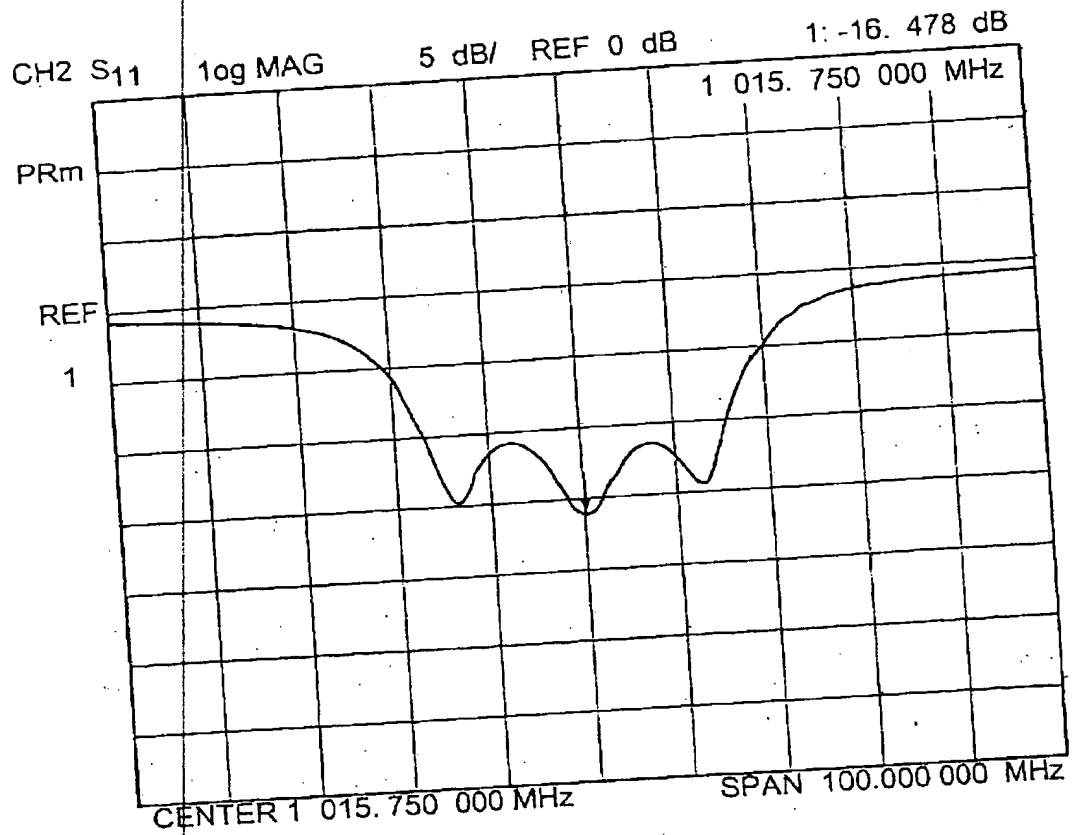


FIG. 34e

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☒ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.